

Pit and Quarry

Member
Audit Bureau of
Circulations

With which is consolidated
**CEMENT-MILL
& QUARRY**

Read in
Largest Number
of Plants

Vol. XXIII

CHICAGO, FEBRUARY 10, 1932

No. 10

Mining Engineers to Hold Annual Meeting

PLAN IMPRESSIVE PROGRAM

The 141st annual meeting of the American Institute of Mining and Metallurgical Engineers will be held February 15-18 at the Hotel Commodore, New York, N. Y.

More than 150 technical papers are to be presented at the various sessions. The Committee on Nonmetallic Minerals will conduct its divisional meeting on Wednesday, February 17. Papers to be read at this session include the following:

"Mineral Wool Resources of Indiana." By W. N. Logan.

"Soap Flotation of the Nonsulfides; Limestone, Phosphate Rock, Bauxite, Fluorspar, Rhodochrosite, Manganese Oxides, Barite, Siderite, Chromite, Scheelite and Ferberite, and Cyanite." By Will H. Coghill and J. Bruce Clemmer.

"Magnetic Beneficiation of Nonmetallies." By Samuel Gibson Frantz and G. W. Jarman, Jr.

"The Mining and Treatment of the Sillimanite Group of Minerals and Their Use in Ceramic Products." By Frank Harwood Riddle.

"Uniform Cost Accounting in the Crushed Stone Industry." By William E. Hilliard.

"Quarry Waste in the Indiana Limestone District." By J. B. Newsom.

"Results of Wire Saw Tests." By J. B. Newsom.

"The Geology of Some Kaolins of Western Europe." By Ernest R. Lilley.

"Mineralogy of the Potash Mine near Carlsbad, New Mexico." By W. T. Schaller.

"Geology of Molding Sand Deposits." By David W. Trainer, Jr.

Heimlich Named to Head Empire State Producers

Officers were selected and other business transacted at the meeting of the New York State Stone Producers' Assn. held January 20 at the William Penn Hotel in Pittsburgh, in connection with the convention of the National Crushed Stone Assn.

A. L. Worthen, president of the national association, made a brief address in which he complimented the New Yorkers upon their fine represen-

tation at the convention. More than 45 delegates attended from the Empire State.

Officers elected were: President, J. L. Heimlich, LeRoy Lime & Crushed Stone Co., LeRoy; Vice-president, H. E. Rainer, Federal Crushed Stone Corp., Buffalo; and secretary-treasurer, George E. Schaefer, General Crushed Stone Co., Rochester.

A resolution was passed changing the financial structure of the organization to permit a greater revenue, and consideration was given to the change in specifications in New York which now require that, on highway construction, all stone must be washed excepting that used on the base course.

Huge Sum for Building in Far West This Year

Plans for the expenditure of \$650,000,000 for new construction in 1932 in the eleven states of the far west have been reported by *Western Construction News*. Included in the total is \$283,000,000 for streets and highways, \$335,000,000 for water and irrigation systems, \$15,000,000 for rivers and harbors, and \$17,000,000 for flood control.

Paul Ales Gravel Plant Suffers Damage by Fire

Damage estimated at \$7,500 was caused by fire which completely destroyed a large store house containing considerable electrical equipment at the Paul Ales gravel plant of the Materials Service Corp. of Chicago at Lockport, Ill., recently.

Acquires Illinois Stone Deposits; to Build Plant

The Ste. Genevieve Quarry Co. of Ste. Genevieve, Mo., is reported to have acquired several acres of limestone deposits near Chester, Ill., where a new plant and quarry are to be developed this year.

Will Supply City Plant With Filtration Gravel

The Lane Sand & Gravel Co. of Eugene, Ore., is installing screens at its new plant preparing to furnish quantities of sand and gravel on its first order, the material to be used in the city's filtration plant. C. M. Igou is manager.

Users of Waterways Threatened by Bill

VICIOUS PLAN BEFORE SENATE

Senate Bill 1963, introduced by Sen. Hiram Johnson of California and now before the Commerce Committee of the United States Senate, undertakes to make every vessel which runs on a regular route in interstate commerce subject to the jurisdiction of the Shipping Board as to rate and routes.

This is an attempt to apply all of the restrictions now enforced against rail lines by the Interstate Commerce Commission to every boat and barge line, little or big, operating on any navigable water. There is no analogy between a regulated railroad operating on its own right-of-way, upon which no one can trespass without penalty, and a public waterway.

The bill would make the common carrier on inland waterways subject to destructive competition by the railways and motor trucks. And, of far more importance, might prohibit many dredging operators from transporting the sand and gravel they produce on their own carriers. The bill, if it becomes a law, would also hamper the movement of cement, crushed-stone and other products by company-owned barges.

The following paragraph, quoted from the bill, sums up its provisions:

"Sec. 1A. From and after one year from date of enactment of the Shipping Act, 1932, it shall be unlawful for any common carrier by water in interstate commerce to transport any article or commodity manufactured, mined, or produced by, or under authority of, or owned in whole or in part by, such carrier or by any person directly or indirectly controlling, managing, or operating such carrier, or in which such carrier or person may have any interest, direct or indirect: *Provided, however,* That nothing contained in this section shall apply to such articles or commodities as may be necessary and intended for the use of such carrier in the conduct of its business as a common carrier. Any common carrier by water in interstate commerce transporting any article or commodity contrary to the provisions of this section shall be punished by a fine of not less than \$5,000 nor more than \$10,000 for each offense, to be recovered by civil action.

Slate Association Names New Officers

E. R. NORTON IS PRESIDENT

Results of the election held at the annual meeting of the National Slate Assn. held in January have just been announced as follows:

President—E. R. Norton, Norton Brothers, Granville, N. Y.

Vice-Presidents—R. D. Chapman, Chapman Slate Co., Bethlehem, Pa.; W. A. Kitto, Natural Slate Blackboard Co., Pen Argyl, Pa.; Doster Focht, Vendor Slate Co., Easton, Pa.; Arthur Carpenter, Marble & M. Slate Co., Fair Haven; W. A. LeSueur, Buckingham Virginia Slate Corp., Richmond, Va.

Treasurer—R. B. Lewis, Phoenix Slate Co., Wind Gap, Pa.

Directors—A. H. Morrow, Rising & Nelson Slate Co., West Pawlet, Vt.; S. J. Spry, Colonial Slate Co., Bangor, Pa.; F. C. Sheldon, F. C. Sheldon Slate Co., Granville, N. Y.; Elwood Doney, Doney Slate Co., Pen Argyl, Pa.; John Williams, Buckingham-Virginia Slate Corp., Richmond, Va.; J. O'Brien, O'Brien Bros. Slate Co., Granville, N. Y.; W. H. Smith, North Bangor Slate Co., Bangor, Pa.; N. M. Male, Jackson Bangor Slate Co., Pen Argyl, Pa.; H. D. Hicks, Evergreen Slate Co., Granville, N. Y.; L. Renton Brown, Structural Slate Co., Pen Argyl, Pa.; Richard Jackson, Stephens Jackson Co., Pen Argyl, Pa.; M. L. Parsons, Parsons Bros. Slate Co., Pen Argyl, Pa.

Treasurer R. B. Lewis is recovering from an illness in a hospital at Philadelphia. A meeting of the new board of directors was held following the close of the regular sessions of the association and W. S. Hays, trade-association executive, Philadelphia, was elected secretary and assistant treasurer.

Sales as estimated by the U. S. Bureau of Mines from reports received from quarrying companies for the year 1931, were valued at nearly \$5,500,000. This was a decrease of 32 per cent. from the sales of 1930. However, total construction was off by nearly the same percentage so that the slate industry did not fare any worse than others depending for the major market upon building activities.

Process for Production of Tan Cement Perfected

The following item appeared recently in the San Francisco Chronicle: "A new process for producing tan colored cement has been developed, the Pacific Portland Cement Co. of San Francisco.

"The cement was developed because of a public desire for a brighter color than the ordinary gray.

"The tan color results from a special burning process. The process was worked out at the company's laboratories at Redwood City over a

period of several years. Hitherto it has been possible to color cement only by adulteration with pigments.

"Robert B. Henderson, president of the company, said the process marks the first real improvement in the basic color of Portland cement since its discovery 108 years ago."

Illinois Lets Contracts for Cement to 3 Firms

Rejection of bids on 3,439,000 bbl. of cement and of contract awards on 1,561,000 bbl. was made recently by the Illinois highway department.

Cement purchased was obtained at 30c a bbl. less than a year ago, bringing the price to the lowest in history of Illinois road construction, according to Chief Highway Engineer Frank T. Sheets.

Total contract price was not revealed, but the successful bidders and amounts follow:

Alpha Portland Cement Co., 1,300,000 bbl.; Dewey Portland Cement Co., 122,000 bbl.; Missouri Portland Cement Co., 139,000 bbl. New bids for the remainder will be received at an early date, officials said.

Seek to Remove Gravel Plant from River Site

Removal of the gravel plant, storage bins and a quantity of material of the Builders' Sand & Gravel Co., Davenport, Ia., from the site of construction of the Mississippi River roller dam at Davenport, is being negotiated by United States river engineers and officials of the firm. Properties on which the gravel firm was operating have been purchased by the government in connection with construction of a dam for the 9-ft. channel project on the upper Mississippi River.

Operate Stone and Lime Firm to Aid Unemployed

Directors of the Corydon Crushed Stone & Lime Co. of Corydon, Ind. have declared a dividend of 10 per cent. The company, which is incorporated for \$14,400, with fifty-two stockholders, was organized several years ago to provide labor for men who otherwise would be unemployed. Six thousand dollars was paid for labor in 1931. Officers elected for this year are: William J. Bulleit, president; E. S. Bulleit, vice-president; Charles A. Keller, secretary and treasurer.

Rock Island Gravel Co. Holds Annual Meeting

Annual stockholders and directors meetings of the Rock Island Sand & Gravel Co., of Rock Island, Ill., were held January 15, and the former members of the board were reelected, and

in turn the board reelected the four officers of the company. Directors are C. J. Larkin, Robert F. McConochie, William H. McConochie, Harry J. Larkin, Leo A. Larkin, William Kinner and Jacob Imhof.

Officers were reelected as follows: President, Charles J. Larkin; vice-president, Robert F. McConochie; treasurer, William H. McConochie; secretary and manager, Harry J. Larkin.

Sues City for Granite Used in Sewage Plant

The city of Delaware, O., has been named defendant in a \$609.71 suit filed against the city by the Northern Granite & Stone Co. of Cleveland.

The petition alleges that in 1927 when the city was erecting a sewage-disposal plant, it purchased a quantity of crushed granite for the construction of filter beds at the cost of \$2109.71 which was to be paid within 30 days after delivery of the stone. The petition claims that on Jan. 10, 1928, \$1,500 was paid on the bill leaving a balance of \$609.71. The plaintiff contends the balance was never paid.

Sen. Norris Fumes Over Cement-trade "Monopoly"

The existence of an "absolutely illegal monopoly" within the cement industry was charged in the Senate last month by Senator Norris, Republican of Nebraska.

Senator Norris made his charge while the Senate was debating an appropriation to continue the Federal Trade Commission's investigation of the industry.

Utah Court Holds Hand Labor Unconstitutional

The supreme court of Utah held on January 23 that use of hand labor instead of machines on a public construction project results in substantial increase in the cost of the project and therefore is unconstitutional.

The court granted a writ of prohibition stopping Salt Lake City from proceeding with the construction of a \$600,000 storm sewer on a minimum-wage, hand-labor basis, holding that the program violates a section of the constitution which specifies that money appropriated for one purpose can not be diverted to another purpose.

Lime Plant in Chicago Making Mixed Products

Cement-lime plaster and mortar mixtures are being prepared at the Chicago plant of the Marblehead Lime Co., according to B. L. McNulty, president, the finished product being packaged and shipped under arrangements made with the Reardon Cement Co. of Cleveland, O.

Lime used in the products is produced at the Marblehead plant, while the cement is purchased locally.

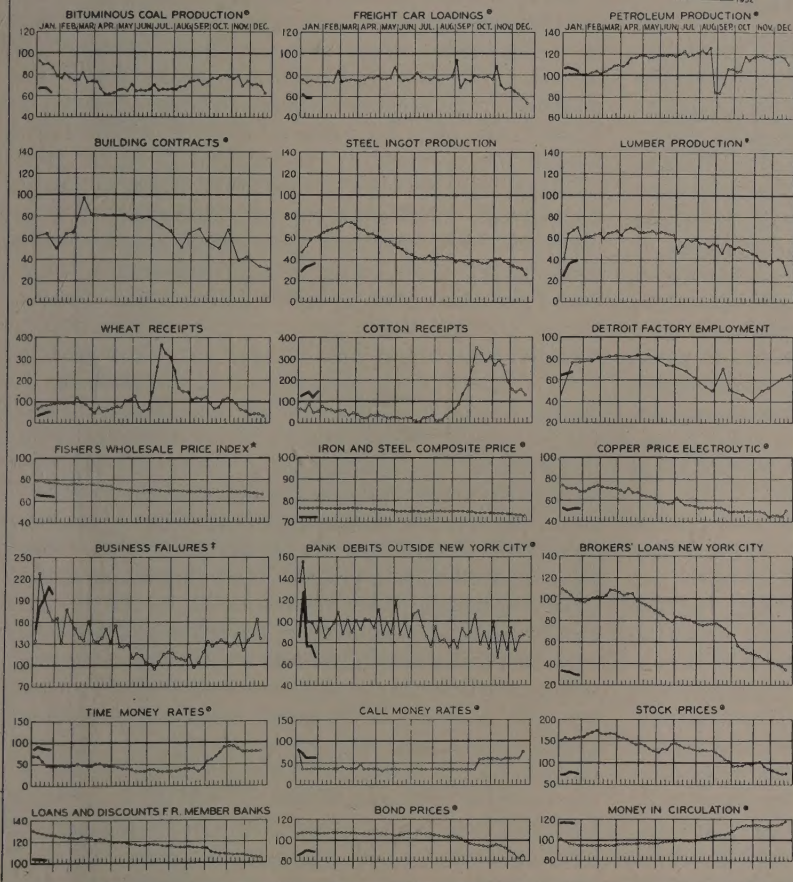
WEEKLY BUSINESS INDICATORS

SURVEY OF CURRENT BUSINESS

UNITED STATES DEPARTMENT OF COMMERCE

DATA PLOTTED, WHERE AVAILABLE FOR WEEK ENDING JANUARY 30, 1932
WEEKLY AVERAGE, 1923-1925, INCLUSIVE-100

LEGEND



* DAILY AVERAGE * RELATIVE TO 1926-1929 * NUMBER * RELATION TO WEEKLY AVERAGES 1925-1931 PER WEEK SHOWN

Resume Operations at El Paso Cement Plant

Operations at the Southwestern Portland Cement Co. plant at El Paso, Tex., have been resumed following a 16-day shut down for repairs, according to H. E. Nichols, superintendent.

The plant is back on the same basis as it was before it was closed January 1. About 120 men are employed. Only one of the three kilns is being used, however, the other two having been idle since last August.

"We hope to continue operations along the present lines indefinitely," the superintendent said. "The rumor that we planned to close until business conditions improved was without foundation. Our existing contracts with Texas and New Mexico firms will keep us busy for some time."

Concrete-Products Men Meet at Longview, Wash.

The mid-winter meeting of the Northwest Concrete Products Assn. was held January 22 and 23 at the Monticello Hotel, Longview, Wash. Among the interesting papers read at

the gathering were: "Rapid Hardening Cements as Applied to the Manufacture of Concrete Products," by F. H. Ronk, chief chemist, Olympic Portland Cement Co.; "Concrete Products Promotion for 1932," by Frank Barrett, manager of the Seattle district office of the Portland Cement Assn.; and "Mixes for Different Sizes of Concrete Pipe," by Prof. George W. Gleason, Oregon State College.

W. H. Sharp, manager of the Longview Concrete Products Co. acted as chairman of the sessions. W. P. Hews of Yakima, Wash., was elected president for 1932.

Marquette's New Clinker Coolers Now in Service

Two new clinker coolers were put into operation on Feb. 1 by the Marquette Cement Manufacturing Co. in its plants at LaSalle, Ill., and Cape Girardeau, Mo. The units were constructed to improve the quality of the product and to expedite production. They are part of the \$500,000 construction program under way by Marquette.

Marquette to Erect New Barge Terminal

PLAN LONG SHIPPING ROUTE

The engineering staff of the Marquette Cement Manufacturing Co. is engaged in the preparation of plans calling for the expenditure of approximately \$25,000 in increasing the barge-loading facilities at the temporary terminal used by the company's barge fleet on the Illinois River at Peru, Ill., during the past year. The concern is looking forward to using waterway transportation on a much larger scale than heretofore in the movement of cement from its Oglesby plant to its distribution and packing plants on the lower Mississippi River, including Memphis, St. Louis and Vicksburg.

Within the next year plans may be started by the company for the erection of a permanent barge terminal south of La Salle on the property purchased several months ago as a terminal site.

At the same time, according to Robert B. Dickinson, vice-president, the company tentatively contemplates an approximate 350-mile increase in its Illinois-Mississippi River cement-shipping route. The new extension would be from Memphis to Vicksburg, which would make a total of about 1,000 miles for the full river run used by the company for its new type of tow-boats and cement barges. Heretofore, the river route was from Peru to as far south as Memphis.

This new, longer route would permit the company to more easily serve all the river cities in the lower Mississippi region, as well as to effect a substantial saving by the use of its own equipment, which is considered the most modern for shallow water operations.

The Marquette company was the pioneer organization in the use of these new types of river tow-boats and barges. After a comparatively short test period the company established a regular shipping route from Peru to St. Louis, Cape Girardeau and Memphis. It is anticipated that if the extended route is finally determined upon, tow-boats and barges will begin operating on a regular schedule, starting as early in spring as river conditions permit.

Cowell Cement Plant to Resume Work in Spring

A force of workmen are reported to be busy at the plant of the Cowell Portland Cement Co. at Cowell, Cal., putting the equipment in shape for the resumption of production.

No date has been set for the start of 1932 work, however, according to officials, although it is believed that operations will again be under way by late spring.

Editorial

The Survival of the Fittest

AT the conventions in Pittsburgh there was much talk of the survival of the fittest, both in the meetings as well as at the small informal gatherings which, this year more than others, gave opportunity for airing opinions which seemed a little too intimate for the convention floor. The ideas expressed in the meetings, whether by the speakers or by those who participated in the discussion of their subjects, were carefully guarded to avoid giving offense where none was intended, and there was the customary reluctance to speak openly on subjects that everyone must have felt were of paramount importance. But in the private talks which followed there was commendable frankness, destructive competition was called by its right name, and everyone seemed to feel the more comfortable because of it.

The distress of reduced business has undoubtedly made it difficult for many producers to exist, to say nothing of operating on a profitable basis. As everyone knows, a falling market brings out the worst elements in our natures, because it makes profits and, indeed, living insecure, because it confronts us with the naked problem of existence and with the crude forces that struggle for supremacy. In times of depressed business the social veneer is easily cracked and it then exposes characteristics which are not pleasantly looked at by those who pride themselves on their social advance. We see, revealed in all its ugliness, the dog-eat-dog nature of the wolf, the easy readiness with which we revert to primitive instincts, when only so much as our pocket-books are touched.

But this reversion to the baser standards brings its punishment as well as its temporary compensation. It brings back to the reversioners the dangers and the penalties of the eye-for-an-eye philosophy at the same time that it lowers the general standards of conduct. The adoption of price-cutting, the violation of solemn agreements, the defamation of competitors, the favoring of certain customers above others—these are the implements of the savage, because they make no demands on intelligence or courage, they make no use of generosity, they are the very antitheses of good sportsmanship. They are the weapons of the man who is afraid to trust his future to his intelligence, who is afraid to play the game according to the rules, yet is determined to save himself at all costs. He has small cause for complaint if, in the present maelstrom, where modern ideas of coöperative effort and mutual aid are contending with the self-preservation brutalities of savage life, he is swept aside as one unfit to take part in the great spectacle which the times present.

Many producers, many business men of all kinds, in other fields as well as ours, are disappearing from the competitive scene because their methods did not enable them to survive the struggle. They have adopted every means available to them in order to make their own way easier, even if those means meant the damage or destruction of their competitors and, perhaps, irreparable injury to entire industries. Who shall mourn, therefore, if their own acts have hastened their disappearance; who shall bewail their going, if their absence will improve the general state of business, if the repudiation of their methods and principles will lead us to a higher level of business integrity and fair-dealing.

It is true that the present times are purging industry of many of its least desirable and least useful factors. But the good accomplished is a relatively small one, because the purging has not been sufficiently extensive and too many of the irresponsibles remain. Severe as conditions have been, they have lacked that degree of hardship that would have insured lasting gains. Too many of those who have apparently been shoved aside in the present cleansing period will live to harass reputable business in the future, partly because even a decrepit business has remarkable powers of revival, largely because, although a business may collapse financially, it does not collapse physically, and its production facilities live on to tempt the bargain-hunting investor who can be led to revivify it with his financial help. Too often this will be the case in our industries. Producers may disappear, but their plants remain, and what is more attractive to the investor than an abandoned plant that can be purchased for much less than its real value? Such a property, acquired at insignificant cost, can produce much more cheaply than one whose actual cost must be borne by the product. Its owner stands in the position of one whose plant cost has been written off the books, and he will be able to undersell all his competitors to the extent represented by his investment advantages divided by his units of product. He may threaten their security to such an extent that they may literally be forced to purchase his plant at a fabulous price.

Although the survival of the fittest is an entertaining principle, one that engages the imagination and seems to point to a better future, we do not live long enough to observe its workings on a broad scale. Yet large-scale elimination of the unfit is just what industry needs, in other industries as well as in ours. Isolated examples of commercial extinction, even though they be more numerous than in "good" times, are not sufficient in number or importance to affect the general situation. What industry needs is a realignment of forces, a stronger consolidation of the more stable elements through

more general and more hearty support of trade-association work and a greater unanimity of thought with respect to the elimination of the unfit and as to who constitute the unfit.

We are witnessing the extinction of many producing factors, to be sure, but we shall just as certainly witness the revival of many of them and the introduction of many new ones. Until some means are devised for preventing the resurrection of industrial carcasses, until we contrive some method of industrial birth control, industry will continue to be overcrowded, overfinanced, overexpanded. Until we can develop a system for preventing the needless enlargement of production facilities in a given industry, we shall be faced with the continuous and ever-growing menace of overdevelopment. Until we find some method of preventing the entry into an industry of unneeded newcomers, there will be no betterment of present conditions.

This great problem confronts industry. It must either make its own future secure by contriving means for insuring the survival of the fit, or it must face the socialization of industry. If it should fail to do the former, it will inevitably disintegrate from internal strife, from the prohibitive costs of uncontrolled competition, and from the shrinking demand for its goods which higher costs will produce. Business can not go on, continuing to expand and continuing to make consistent and sizable profits, if it will allow its strength and its resources to be

frittered away by an unnecessary expansion of production facilities. There is a definite limit to the consuming power of every individual, based on his buying power and on his desires, because there are definite limits to his earning power and his time for consuming, and these limits are fixed for different periods of time. Therefore, business must determine for itself to what extent it will allow its present investment to be threatened and made insecure by the unchecked ambitions of those who contend that there is no limit either to desire or the power to gratify it and that, for this reason, every field must be open to all comers, regardless of experience, fitness, or need.

If competition can not be regulated by those who create and participate in it, its cost will reach such heights that the public will be unable to support it and it will collapse and disappear as an economic system. No one will have any difficulty in guessing what its successor would be, and few business men can look on that prospect with anything but misgiving. So it behooves business men to regulate their own work and, so, fix their own future, if they do not want both tasks to be done by the public.

The fit will survive, but who are the fit? Those who fight among themselves for public favor and ask the public to pay the cost of the strife? Or those who can compose their differences, render a social service at a fair price, and realize a fair profit while doing it? The decision is in the hands of business men themselves.

Quarry Workers in Europe Seeking International Federation

As an outcome of a congress of international pottery workers at Limoges, the head centre of the French industry, the International Labor Office at Geneva foresees a multi-federation of stone workers and quarrymen allied therewith. Clay and pottery workers have already separate organizations in France, Belgium, Austria, Switzerland and Sweden.

Stone workers and quarrymen's organizations have urged the Labor Office to take up the question of silicosis in the schedule of occupational diseases. The disease is what is known as "dust disease" and is met with in all mining, quarrying and other occupations where abrasives are a factor. A medical conference on silicosis was held at Johannesburg, South Africa, under the auspices of the International Labor Organization in 1930. There was represented the United States Department of Health in the person of Dr. Albert E. Russell, assistant surgeon of the Public Health Service at Washington.

Various international bodies of stone workers, miners and ceramic workers are seeking the adoption of compulsory measures to prevent "dust disease" and suggest that the periodical examination of all workers be undertaken in the allied industries that they may be "removed from their

workplace" before a critical phase is reached. The German industries appear to have the best formulated plans along these lines.

Existing conditions in the various trades affected by silicosis throughout the world have been set forth in a document issued by the Labor Office. This deals with the scientific aspect of the question both from its pathological and clinical sides.

The investigation was undertaken at the instigation of the International Stone Workers' Organization and was carried out by the Hygienic Service of the Labor Office. It was brought out that the South African Rand mines suffered an annual toll of \$5,000,000 by reason of the necessity of combatting the disease of silicosis in conformity with labor laws which compelled them to protect and compensate workers suffering therefrom.

The list of trades wherein silicosis was an ever-present danger was found to be long—including type foundrymen, stereotypers, etc.—but the chief sufferers are those of the cement, stone and pottery industries.

It was suggested also that the shale-oil industry was a potential developer of the disease. This fast-developing industry in the United States is set down as something which will bring in its wake the need for special care with regard to its workers if the industry itself is not to carry an inordinate load of financial responsibility in retribution and damages, which in the long run will affect net profits and the dividends of share holders.



Tables were grouped cabaret style at the annual banquet in the hotel ballroom and many of the guests enjoyed the dancing which followed the dinner.

Gravel Operators Renew as Industry's Leaders

THOSE who attended the sixteenth annual convention of the National Sand & Gravel Assn., Jan. 27 to 29, in Pittsburgh, and expected to be rewarded for their time, trouble and expense were not disappointed. Judging by the discussions during the meetings and the many comments freely given outside the meetings, everyone present reacted favorably and strongly to the stimulating speeches which characterized every session of the convention. Certainly all those who expressed their opinions within the range of the reporters' ears were lavish in their praise of the skill and understanding with which the program had been planned and carried out. Its serious features—and there were plenty of these—as well as its entertainment features merited and received highly complimentary comment.

The facts that the opening session was devoted largely to a discussion of the special problems peculiar to the present period and that the discussions were lengthy and helpful and were participated in by an unusually large number of those in the audience is sufficient evidence of the seriousness and intelligence that characterized all the meetings. This session set the pace for the entire convention and made it an event that will not soon be forgotten.

In opening the convention President Potts, the retiring head officer of the association, recounted very briefly some of the organization's accomplishments during the year and expressed his appreciation for the opportunity of helping in the furtherance of the association's work.

Stimulating Addresses and Entertainment Mark Meeting; H. V. Owens Chosen President

Willard T. Chevalier, publishing director of *Engineering News-Record*, opened the way for a lengthy and animated discussion of present business problems when he spoke extemporaneously on the suggestive title, *Where Do We Go from Here?* In his opinion, our current difficulties are due principally to the fact that excessive deflation has aggravated our debt problem, because our debt-burden, even though it may remain fixed in amount, has really increased in severity through reduction in our worth. As he explained, we are living in a world characterized by five outstanding qualities: (1) Debt; (2) deferred buying; (3) low prices; (4) impaired credit; and (5) overdeflation.

In referring to the construction industry he defined it as the fixation of capital in new facilities. This capital must come, he said, from present surplus earnings or from the discounting of future earnings. It must be divided two ways: (1) Wages, interest, and dividends, which constitute buying power; and (2) facilities for production, which consti-

tute producing power. The success of the construction industry depends on the wisdom with which this division is made.

Expressed in dollar values, engineering contracts (including private and public works) in 1931 amounted to 77 per cent. of those in 1930 and to 62 per cent. of those in 1929, according to Mr. Chevalier. Contracts for public works in 1931 were 102 per cent. of those in 1930 and 105 per cent. of those in 1929, while those for private works in 1931 were only 58 per cent. of those in 1930 and 40 per cent. of those in 1929. The construction-cost index of 1931, excluding costs of management, was 16½ per cent. below that of 1930. The construction industry in 1931 was 4 per cent. below that of 1925. Private works, which constituted only 40 per cent. of all construction in 1925, amounted to 58 per cent. of the total last year.

Three factors are essential in every construction enterprise: (1) The promoter; (2) the investor; and (3) the investment agency. The promoter is timid because of the feeling that the country is overbuilt and that there is no market for the product of new facilities. The investor is mistrustful because of his fear of the burden of unliquidated debt which

now 33 per cent. In the minds of all groups caution has supplanted enterprise and safety has supplanted risk.

In the opinion of Mr. Chevalier, the claim that the country is overbuilt is no truer now than it was in 1923. America is still in the constructive era as contrasted with Europe which is in the operating era. The present surplus of buildings, both private and industrial, is but temporary, and our estimates of the demand for such facilities must not be based on present conditions. There is a continually growing demand for more and better floor space. Housing, he said, is still in its infancy and the development witnessed by the last generation will be doubled or tripled. Our development does not depend on the rate of population growth but on the rate of growth in our wants. The saturation point in our demands for products and services has not yet been reached and new ones will be created.

Our present difficulties, thinks Mr. Chevalier, are due to a lack of lenders, and our problem is to restore their confidence. Our debt burden is draining our buying power, but our debts will certainly be paid off or they will be written off if they are unjustified. When the public depreciates our worth and our debts become a burden; when the public raises our worth, the burden will be lightened; hence the importance of raising prices and values. Improvement in the credit status of the railroads will improve general business, he said.

Mr. Chevalier stated that the construction industry must be integrated in order to eliminate wastes;

that is, the designing, contracting, equipment, and financial groups must combine. The construction industry is

Delegates and guests enjoyed a card of amateur boxing bouts as part of the convention entertainment. The ring and spectators are shown below.

Faith and Friendships Gather at Pittsburgh

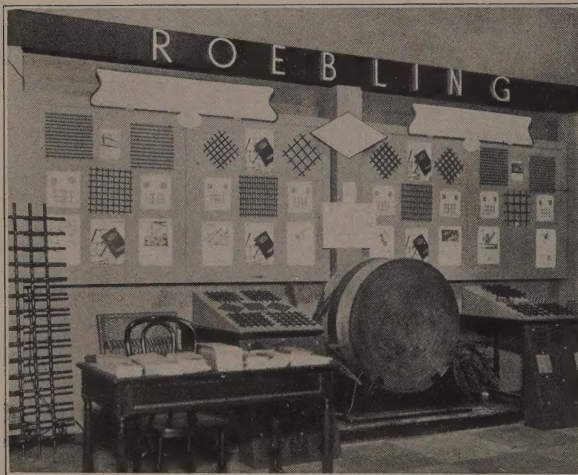
rests on existing enterprises. The banker's fear of withdrawals and his inability to realize on his assets—his worship of liquidity—deter him from lending, while the insurance companies' assets are less liquid than normally on account of the large amounts outstanding in loans to policy holders; this amount (which is normally 12½ per cent. of their assets) is



irresponsible because it includes so many individual units that can not be controlled. As a result, we have the high-cost producer who fattens in times of prosperity and cuts prices in times of slack business. Those who try to perpetuate this type of "unfit" are not doing a favor to industry, he said. We are performing a public service by "squeezing out the weak sisters."

Loans and expanded credit will not remedy the present situation; they are only palliatives, according to the speaker. Costs must be reduced by more efficient production and merchandising. The aim should be to produce the best product by the best means and pass the gains to the consumer. Available credit must not be squandered.

Mr. Chevalier condemned the practice of increasing the amount of land labor in order to increase employment. If it is wise to substitute the hand shovel for the power shovel—as has been done in some unemployment-relief programs—then it must be equally wise to supplant the teaspoon with the hand shovel. Although there is great need for work for those unemployed, this must be paid for out of the surplus earnings of the employed, and it is futile to create work that does not produce valuable results.



Wire-screen cloth exhibit of John Roebling's Sons Co. with cross-section of cable from new Geo. Washington Bridge at New York in center.

The great advantage of public construction as compared with private construction lies in the fact that while it provides wages it does not at the same time create products that must be purchased immediately, as is the case with the building of factories. Of course, public construction must be paid for ultimately, but its cost is spread over a period of years. Special public construction should be considered only as an emergency measure.

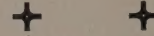
Among remedies for the present situation Mr. Chevalier recommended:

(1) That we set our own house in order by the adoption of the most efficient methods to lower production costs, by the elimination of irresponsibility, by the avoidance of further borrowing, by continuous liquidation, and by discouraging wildcat speculation.

(2) That we foster only economically-justifiable projects.

(3) That we oppose the adoption of fallacious panaceas.

Greater productivity of the individual is the basis of our progress, in Mr. Chevalier's opinion, and to put a premium on inefficiency is to strike at the root of our advance. Production costs must be lowered.



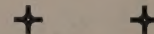
ATTENDANCE AT THE CONVENTION

Producers' representatives	227
(Companies represented, 119)	
Equipment-manufacturers' representatives	153
(Companies represented, 61)	
Trade-publications' representatives	11
(Publications represented, 4)	
Guests	96
(Ladies present, 18)	
Association employees	2

Total attendance 489

LARGE GROUPS IN ATTENDANCE

	Representatives Present
Producers:	
McCready-Rodgers Co.	24
J. K. Davison & Bro.	13
Sand & Gravel Co. of Pittsburgh.....	12
Dravo Contracting Co.....	7
General Concrete Products Co.....	7
Iron City Sand & Gravel Co.....	6
Eastern Rock Products, Inc.....	5
McLain Sand Co.....	5
(One company had 4 representatives; 6 companies had 3 each; 22 had 2 each; and 82 had 1 each.)	
Equipment Makers and Publications:	
Stephens-Adamson Mfg. Co.....	8
Allis-Chalmers Mfg. Co.....	6
Smith Engineering Works.....	6
American Manganese Steel Co.....	5
Macwhyte Co.	5
Niagara Concrete Mixer Co.....	5
PIT AND QUARRY.....	5
Robins Conveying Belt Co.....	5
(Four companies had 4 representatives each; 14 had 3 each; 21 had 2 each; and 18 had 1 each.)	



The high-cost producer must not be saved as an excuse for saving an industry, but he must be allowed to pass out under the effects of decreased business. In "good times" the high-cost producer sets the prices of an industry and when the competitive conditions of depressed business drive him out of the field the next-highest-cost producer takes his place. When prosperity returns, he said, we shall again become sloppy in management, and this will again be our undoing.

E. J. DOYLE, who is head of the Doyle Gasoline & Oil Co., of Rochester, and who spoke on *Sales Lubrication*, cited some of his experiences to indicate the possibility of acquiring business success when there is apparently little with which to work. His business, which was capitalized at \$5,000 four and one-half years ago, now employs 350 workers in furnishing fuels to Rochester and neighboring towns. He cited an instance in which his company increased its October, November and December business to a point in excess of its summer gallonage by the use of a curiosity-arousing campaign in which

the letters TSQ—later explained as standing for “Texaco Starts Quickest”—were used in various striking ways.

He told also of getting the Rochester Automobile Dealers’ Assn. to endorse Texaco gasoline and to allow the use of the endorsement in advertising, on the understanding that a similar endorsement would be given to any other oil company that requested it. An advertisement featuring the recommendation was run and, although the other oil companies were furious on seeing the result, they did not want to appear to be copying the Doyle idea, even though they had permission to do so, so they vented their anger in private. “If you are going to be successful in the face of the keenest competition any of us have ever known, you’ve got to be a step ahead of the other man,” said Mr. Doyle in closing.

A resolution making Edmund Shaw, inventor of the Shaw classifier, an honorary member of the association was presented and adopted.

The Wednesday afternoon session, presided over by F. A. Bingham (Northern Gravel Co., West Bend, Wis.) and D. D. Guilfoil (Sauerman Bros., Inc., Chicago, Ill.), was devoted to the reading and discussion of three papers describing the methods and costs of winning and preparing gravel at three of the most economical sand-and-gravel plants in the country, each using a different method but operating under conditions similar enough to allow a fair comparison of operating costs to be made. These papers are part of a series of similar studies being published by the United States Bureau of Mines with the coöperation of plant operators. They give descriptions of the methods and costs of operation at various typical mineral plants in the United States. The papers that were presented covered all phases of sand-and-gravel plant operation in great detail and were without question one of the outstanding features of the convention.

THE first paper, *Methods and Costs of Mining and Preparing Sand and Gravel at the Plant of the Ward Sand & Gravel Co., Oxford, Mich.*, was prepared by Frederic L. Ward, president of this company and inventor of the Ward jet system of hydraulic dredging. Mr. Ward was unfortunately unable to attend this convention so his paper was

read by his brother, F. D. Ward, who is associated with him in his activities in this field.

Mr. Ward began his paper with a brief description of methods used by the company from the time it began operations in 1915. Slack-line cableways were first used, but in 1920 these were replaced by a 16-in. dredge pump and a booster pump, both of the standard centrifugal type. In 1924 the plant and dredge were moved to a new location and the plant rebuilt in substantially its present form. Experiments were being carried on at this time with the so-called Ward jet system and this was put into regular use in 1925. This installation was made to increase the capacity of the plant and has suc-



Booth of Blaw-Knox Co. with large photographs and miniature truck mixers.

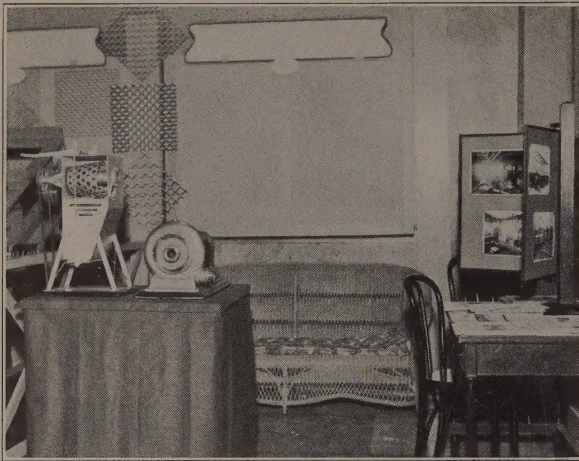
ceeded beyond the fondest expectations of the company. According to Mr. Ward, this system has enabled the company to secure a lower production cost per ton as well as a lower power cost than it has been able to obtain with other types of equipment. Subsequent experiments have resulted in a number of changes in the original equipment and Mr. Ward believes that sand and gravel can now be mined by this method more cheaply than by any other, provided, of course, that the deposit is suitable. A table of tonnage shipped and operating costs per ton f.o.b. cars shows a steadily decreasing cost of operation. A surprising thing about these costs is that 1931 showed a considerably lower cost per ton than 1930, in spite of a considerable decrease in production.

The deposit of sand and gravel at Oxford is a glacial formation covering several thousand acres and extends to a depth of about 100 ft. below water-level. Mr. Ward went into considerable detail in describing the methods used in prospecting the deposit and the factors entering into the choice of the present method of operation. The dredge was also described in considerable detail. The unit used at this plant is capable of dredging to a depth of 110 ft., but it has never been found necessary to go to a depth greater than 97 ft. Two Ward jets are used on this dredge and their combined capacity is about 16,000 cu.yd. per day, but either of these units can be used separately when less capacity is desired.

Gravel is transported from the dredge to the



Attractive booth of U. S. Bureau of Mines with motion-picture exhibit at left.



Hetherington & Berner exhibit with model dredge pump and stone box at left.

washing-and-screening plant on shore by steel barges towed by small steam tugs. The barges are of an original self-unloading type with hoppers which discharge through bottom gates to belt-conveyors which empty into a movable hopper over a belt-conveyor on a floating dock. This, in turn, discharges to the shore belt-conveying system. Plant operations were also described in great detail. The plant is a modern operation consisting of primary-crushing, secondary-crushing, and washing-and-screening departments with provisions for producing any sizes of material desired without unnecessary handling. Materials are stored in ground-storage piles from which they are recovered by tunnel belt-conveyors. This paper also gave the percentages of the various sizes produced, safety precautions, wage scales, operating costs, and other details of interest to other operators.

In response to this paper E. M. Stevens (Fred T. Kern Co., Milwaukee, Wis.) read a paper prepared by R. C. Collins (Standard Building Material Co., St. Louis, Mo.), in which the costs and operations of this company's new plant at Jedburg, Mo., were compared to those of Mr. Ward's plant. The Jedburg plant operates a modern dredge with a 20-in. centrifugal pump having a capacity of about 1,000 tons per hr. Barges are unloaded to the shore plant by a derrick and clam-shell bucket because of the great variation in the river level which made it impossible for any other method to be used. Vibrating screens are used in this plant and the Kerns tower system of stock-piling aggregates is used, together with a drag-scraper to give additional storage capacity. Some discussion was aroused over the itemized costs of these two operations.

SECOND among the papers on the program was *Methods and Costs of Mining and Preparing Sand and Gravel at the Cloudy Plant of the Dallas Washed & Screened Gravel Co., Dallas, Tex.* This was prepared by Ralph L. Windrow but in his absence was read by J. R. Hill (Gifford-Hill & Co., Inc., Dallas, Tex.). This plant is a medium-sized operation, using drag-lines for removing the overburden and excavating the deposit. The material

is hauled to the plant by locomotives and cars. Sizing is done by revolving screens and sand cones, and the finished product is stored in bins from which it is loaded into cars and trucks by gravity. A small crusher for reducing the "oversize" and several vibrating screens supplement the revolving units. The conditions under which this plant operates and the difference in its capacity compared to the other plants described prevented any fair comparisons being made of the operating costs, but the itemized figures given for each part of this operation are so complete that they are of great interest to every sand-and-gravel plant operator.

THE third paper in this series was *Sand and Gravel Dredging Methods and Costs of J. K. Davison & Bro., Pittsburgh, Pa.*, by George W. Williamson of that company. It gave a brief history of the company and the methods used since it entered the sand-and-gravel business in that vicinity in 1870. The company now operates in Ohio and



Eagle Iron Works exhibit with screw-washer at left and dredge-ladder at right.

Allegheny Rivers, a number of large ladder dredges which prepare the materials before loading it in barges for shipment to the five yards and storage-docks operated by the company in the vicinity of Pittsburgh.

Mention was made of the fact that rubber chute-liners are used on these dredges and that they have five times the life of steel chutes. The use of rubber liners, according to Mr. Williamson, is only advisable when wet material is being handled. He then gave a complete description of the dredge *Allegheny*, operated by his company, together with a description of the type of materials handled, the ratio of sizes produced, and the unit operating costs. This dredge, said Mr. Williamson, can dig to a depth of only 60 ft., so it is sometimes necessary to abandon a deposit of good gravel before the bottom of it is reached.

In the discussion of this paper F. A. Bingham mentioned that rubber chute-lining is used in his plant and that it has given great satisfaction. It is being used successfully on some chutes where the

slope is only 15 deg. and where plenty of water is used. In his plant the rubber is tacked to the wooden chutes, while on the dredge described by Mr. Williamson it is bolted to steel chutes. In response to a question Mr. Williamson said that dredge pumps would not operate successfully in the vicinity of Pittsburgh even if used in conjunction with a ladder of the Swintek type. This, he said, is because the gravel is so compacted that a dredge pump could not operate efficiently and the material is at too great a depth for a ladder of this type to be used effectively. This statement aroused considerable comment and Otto Kuehne, Jr. (Kansas Sand Co., Topeka, Kan.) stated that he has been using dredge pumps and a Swintek ladder successfully for years in the Kansas River under conditions as severe as those found in the rivers near Pittsburgh and at equally great depths. Quantities of shale encountered along the river bottom were no great handicap to the use of this method of dredging, he declared.

ON Thursday morning the session was presided over by Alexander Foster, Jr., who introduced, as the first speaker, F. H. Jackson, U. S. Bureau of Public Roads, Washington, D. C. The subject of this address was *Designing Concrete Paving Mixtures by Water-Cement Ratio Trial Methods*. Mr. Jackson first briefly reviewed former methods of proportioning concrete and describing the quality of concrete as those characteristics which affect strength durability, permeability, etc. A series of lantern slides illustrated the effects that the quality of aggregates has on the finished concrete.

According to Mr. Jackson, pavements must be the most durable concrete and their thickness should be changed to suit the strength of the aggregates used. Slides were used to illustrate various state highway tests showing the results of using different aggregates and cements. He also cautioned that this trial method should only be used where adequate test facilities are available and where the relations between the contractor and the engineer are of the best, as this method requires the coöperation of both parties to insure the best

possible results. The small number of tests usually made because of their high cost also makes it necessary that extreme care be used. Mr. Jackson ended his paper by citing test results showing the close relation in the strength of beam tests of concrete and beams cut out of the finished slab after it had been properly cured. He also cited figures which showed the extremely small effect on the cost of concrete by the use of a higher cement factor.

In the discussion of this paper Stanton Walker made the statement that the surface texture of concrete is important and said that no really accurate



Exhibit of Link-Belt Co. with vibrating screen, conveyor idlers and speed reducer.

method of predetermining strength or other qualities of concrete has yet been found. F. A. Bingham then described some of his experiences with the effect of various screen sizes on concrete and urged that efforts be made to formulate standard specifications for general use.

The next address, entitled *Some Comments on Aggregate Specifications*, was made by H. S. Mattimore, engineer of materials, Pennsylvania State Highway Department, Harrisburg, Pa. He began by giving some advice on how specifications should be written. They should always be designed to conform to the best available material; they should describe clearly what is wanted and not the reverse; and producers should always be consulted in order that the best methods of preparing the available aggregates may be ascertained. He then commented on the good work being done by the trade associations but said that they should expand their research facilities in order that new uses and markets may be found for the products of their industries.

The use of aggregates for low-cost roads is a subject on which very little is actually known, said Mr. Mattison, and he advised that some of the efforts of the research department be devoted to this subject. The value of gravel for all courses of bituminous-macadam roads has not yet been proved and the rejection of any one size for this purpose may often lead to the same fate for other sizes. He then commented on the increasing pro-



American Manganese Steel Co. display with dredge-ladder at left and pump in center.

duction of crushed gravel, which is making it more suitable for macadam roads and is narrowing the division between gravel and crushed stone for this use. According to Mr. Mattimore, the gravel required for high-type macadam roads should be of higher quality than that used for concrete. He proposed that gravel specifications be made for the following four grades of gravel: Washed, uncrushed gravel; uncrushed gravel; crushed gravel; and 100-per cent. crushed gravel.

Stanton Walker opened the discussion of Mr. Mattimore's paper by mentioning a number of places where uncrushed gravel is being used successfully for macadam roads, and he stated that the percentage of crushed gravel used had very little effect on its stability. Alexander Foster, Jr. then told of a bituminous-macadam road in Pennsylvania on which a rounded-gravel top course had been used and which has survived more than 6 months' extremely heavy traffic. The ensuing discussion was participated in by many of those present and brought out some interesting facts on the use of uncrushed gravel for bituminous-macadam roads and for surface treatment. Charles Upham, engineer-director, American Road Builders' Assn., Washington, D. C., made a few brief comments on the trend toward low-cost roads as evidenced at the recent Road Show in Detroit.

Specification and Production Problems from the Viewpoint of the Engineer was the subject of the next paper by P. J. Freeman, chief engineer of tests, Allegheny County, Pittsburgh, Pa. A few years ago, said Mr. Freeman, the prime require-



Large shovel photo displayed by Ohio Power Shovel Co.

ment, would result in a large decrease in the amount of material rejected.

Mr. Freeman also touched upon the importance of standardizing aggregate sizes and advocated the labeling of each shipment with its size and other characteristics. He deplored the misrepresentation of their product by some producers, saying it is harming the entire industry, and closed by praising the work of the association in promoting quality production.

BECAUSE of lack of time, the next paper, *A Study of Local Pit Production in Minnesota*, by J. W. Kelly, was postponed until the afternoon session. This dealt with the competition offered to established producers by local operations variously known as roadside pits, wayside pits, and the like. While there are places where pits of this type seem to be the only solution of the problem of providing suitable road material at low cost, many established producers question the ability of such plants to make a product of a quality equal to theirs, and they believe that this inability is sometimes overlooked in order to make possible the use of inferior materials.

Mr. Kelly spent most of the 1931 season in Minnesota and during the year visited about 30 paving jobs and 40 aggregate-producing plants in that state, in Wisconsin, and in Iowa. Minnesota's program for the first 6½ months of the year included 420 mi. of concrete highway, which required 1,690,000 tons of aggregate, about 39 per cent. of which was sand, 57 per cent. gravel, and 4 per cent. crushed limestone. Twenty plants—14 permanent and 6 local or portable—supplied the material, 24 per cent. of which was furnished by the portable plants. The average shipping distance was about 65 mi., and the published freight rate 70 c. a ton. Railway shipments were made by two of these plants, the average haul being about 40 mi.

The local pits will probably be in a better competitive situation this year than last, owing to the fact that the average distance of paving jobs from Minneapolis and St. Paul will be about 140 mi., or



Booth of W. S. Tyler Co. with vibrating screen and sieve shakers.

ment of the sand-and-gravel industry was quantity production, but it is now faced with many other problems of an entirely different nature, such as quality, gradation, cleanliness, etc. The reputation of a producer has very little effect to-day, as the engineer requires that all aggregates meet the specifications regardless of any other considerations. The cleanliness of the product is one of the easiest requirements for a producer to meet, but is one of those most often neglected and, as a result, is a constant irritation to engineers. Cleaning out freight cars before loading them, said Mr. Free-

about 16 per cent. greater than it was in 1931. Producers in these cities, however, could derive some compensating advantage if, as in other states, the highway program called for the widening of present roads and adding to the intersections near large cities, according to Mr. Kelly.

With respect to the comparative quality of the products of portable and permanent plants, Mr. Kelly found no important difference, either from personal observation or from an inspection of the reports of routine weekly sampling. Such deviations from specification requirements as were discovered were of a minor character and the conditions which caused them were quickly corrected. Mr. Kelly found that the problem of adequate water-supply and screening area in several temporary and permanent plants had been satisfactorily met during the past year, and that the general situation in this respect is satisfactory.

Inspection methods are not uniformly applied, the difference in the application having a tendency to favor the material of local plants. The permanent plants, being farther from the job, usually ship by railway and the inspectors stationed at such plants are more ready to reject doubtful material than inspectors at local pits. The work of the latter is not subject to further inspection at the job end for these inspectors are stationed at that point, where they are on friendly terms with the plant crew and are, therefore, more likely to pass doubtful material. Mr. Kelly considers it likely, too, that the inspector at the portable plant will be less willing to reject an entire stock-pile comprising several car-loads of material than the permanent-plant inspector will be to reject single car-loads. To correct this tendency the engineer of tests and inspection was asked to have the traveling inspector-instructor devote more attention to those plants which were subject to single inspection and to provide another traveling inspector.

Most of the rejections of material were made against permanent plants, although the tonnage of material involved was about proportionate to the output of the permanent and the temporary plants. Mr. Kelly found that it was difficult to enforce inspection in some cases, such as the mixing of the

products of two or more plants shipping to the same job; the stocking and draining of local aggregate for the required time and quantity limits; fixing the dividing line between acceptable and unacceptable coatings on particles; and checking the results of field inspectors by a laboratory representative.

On the relative merits and demerits of local pits and permanent plants, Mr. Kelly made the following comments:

"From the standpoint of cost, local aggregates should prove economical in outlying locations, since freight is such an important item. Opposed to this are the relatively heavy investment and overhead per unit of aggregate produced, and the lesser cer-



Attractive booth of Fate-Root-Heath Co. (Plymouth Locomotive Works).

tainty as to quality and supply. The first season in any plant is a period of try-out and adjustment and, for a local plant, every year is a first year. Contractors are usually delayed, and often specifications may need to be interpreted liberally to maintain the construction schedule. New pits do not always come up to expectations, and reserve supplies, to carry the job over whenever trouble is encountered, are smaller than in the case of larger plants.

"Local pits in marginal shipping locations should be able to offer lower aggregate prices which would result in lower bids for paving. In locations outside the range of permanent-plant competition it is questionable whether such lower prices would obtain. From the standpoint of the state as a whole (not the highway department alone), this is partially offset by the losses in tax returns to the state, both direct and through the railroads. The state also benefits indirectly through increased employment of train crews and through maintaining the established channels of industry—permanently-operated plants. (In one case, a paving job kept seven train crews busy for several weeks, whereas a competing plant was said to have planned to haul the material a relatively-short distance in trucks.)

"Permanent plants offer a permanent investment of large proportions, subject to tax, and serving the community in other interests besides paving—a factor which should reduce the cost of building and



Full-size dredge pump exhibited by Allen-Sherman-Hoff Co.

other construction. The personnel is relatively stable in location, and is employed for a longer season. Equipment is more flexible to take care of changes in supply or unusual requirements in demand. (In one case experimental aggregates were produced by a commercial plant at considerable expense without an increase in price. In another plant, in Wisconsin, a permanent plant served as an experimental laboratory for a government study of aggregate production.)



Drag scrapers and slack-line cableway models in operation at exhibit of Sauerman Bros. Inc.

"The permanent plant offers a surer prospect of continuous supply, satisfactory quality, and good yield. It is also more convenient to inspect. To the railroads of Minnesota the permanent plants mean about three-fourths of the shipped tonnage and over seven-eighths of the ton-mileage.

"An objection to the centralizing of aggregate production is the possibility of monopoly. Minnesota is so well overlaid with good gravel, however, and has already so many permanent plants at well-distributed locations, that a commercial-plant monopoly is more likely than is the indicated monopoly in local supplies. Competitive conditions are unusually severe."

Mr. Kelly made a brief study of conditions in Wisconsin and Iowa, where these observations were confirmed. Minnesota's temporary plants appeared to be better erected and equipped than those in other states, although local-pit operation has been carried on longer and to a greater extent in Wisconsin, for example.

Contractors generally prefer to buy from the permanent plants because of their superior service. Some of them fear that local pits may develop into monopolies at certain points determined by the expected highway program. They are generally opposed to contractors entering the aggregate-producing business, because of the risks, with which specialists are more familiar. Some contractors oppose the letting of spring contracts in the preceding autumn, as this gives portable-plant operators more time in which to prepare for production. Most of the jobs let in the autumn obtained their materials from local pits.

According to Mr. Kelly, about 92 per cent. of the 100,000,000 ton-miles of aggregate shipment by railways comes from the permanent plants, but this percentage will probably be lower this year, as apparently fewer paving projects will be centrally located. The railroads should consider making reductions in their rates in order to retain business that is expected to go to local pits. So far, according to Mr. Kelly, such rate reductions as have been made were apparently aimed at diverting business from competing railroads.

A state policy of buying aggregates on a blanket basis, f.o.b. plant, for the reason, without knowledge of specific requirements or jobs—a plan that was tried and abandoned in Iowa—is not favored in Minnesota, said Mr. Kelly. However, the proposal that the state buy the aggregate for each job at the job is not so objectionable. Although the state buys cement and, therefore, might logically



Booth of F. M. Welch Engineering Service, Inc., with stacker photographs and model of gravel scrubber.

be expected to buy aggregates, cement is considered a more standardized commodity than aggregate. Contractors have always opposed the state purchase of cement and would also oppose its purchase of aggregates.

To improve and equalize the quality of the aggregates supplied by large and small plants it has been proposed that certain minimum requirements in plant capacity, water-supply and water-pressure, screening area, etc., should be specified, as has been done to a certain extent with concrete mixers and finishing machines. The great differences between deposits make such a procedure difficult and Mr. Kelly believes that most aggregate producers would oppose it as a usurpation of their functions.

Existing plant capacity in Minnesota is far in excess of present needs, according to Mr. Kelly, and, unless some adjustment is made in railroad-freight rates, a larger percentage of aggregate will be furnished by local pits.

In commenting on Mr. Kelly's report, J. L. Shiely (J. L. Shiely Co., St. Paul, Minn.) stated that way-side pits, properly financed and managed, can become big political factors, especially when operated as a chain system. As a preventive, he said, pro-

ducers might secure options on existing deposits, or they might make agreements with contractors, or even enter the contracting business. The solution may lie in the state purchase of materials or in the railroads accepting their responsibility by lowering their rates. The claim that local pits aid employment by requiring the use of trucks is not valid because even material shipped by railway must be handled by trucks at some point.

DR. RALPH J. WATKINS, director of the Bureau of Business Research of the University of Pittsburgh, spoke at considerable length and to a very attentive audience on possible solutions of our economic problems, especially as these are typified now by the present state of business. The title of his paper, *The Swope and Related Plans for Business Stabilization*, was misleading in the sense that it does not indicate the precise nature of his address, which dealt with the function and importance of economic research as a means of remedying the evils of the present situation and of preventing their recurrence. He mentioned an important truth, but one frequently overlooked, when he said that, although business men want to relieve the existing situation, they do not know what to do or what it is possible to do within the narrow restrictions imposed by present legislation. He stated also that



Samples of drive, conveyor and elevator balata belting exhibited by Manheim Mfg. and Belting Co.

our economic system is merely a product of evolution and, therefore, must not be considered as something that can not or should not be changed. In referring to present conditions he said that, in spite of the fact that we have an abundance of material resources and plant equipment, our economic organization is unequal to the task of providing employment or the necessities of life for all our people, and he attributed this situation to two causes: (1) The fact that no one plans for an entire industry, and (2) that no one thinks of all industries as a group. Progress has been made in individual business management, but none in general industrial management. In his judgment, unrestricted competition, as an economic system, has failed and it will be necessary to supplant it by industrial self-control. He

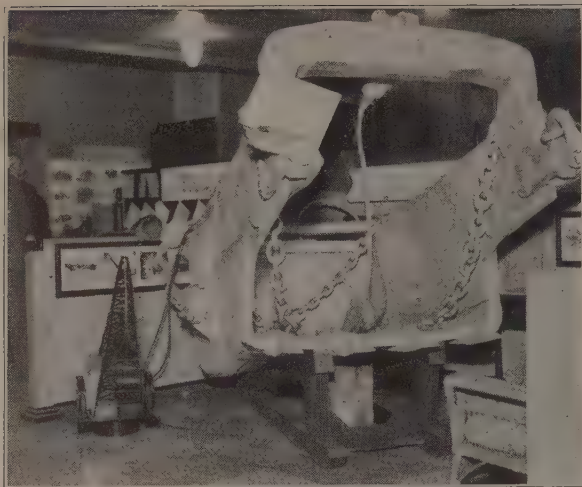
called attention to the fact that industrial depressions are becoming more severe as the concentration of population in the cities becomes denser, the source of economic wealth being in the soil from which labor is being attracted in increasing degrees to the industrial centers. He remarked that by deferring the purchase of non-essential commodities the consumer can almost wreck industry in times like these.

The fact that business enterprise of every kind touches public welfare at some point is, in his opinion, ample justification for government interference and regulation of business, although he believes that the trade association is the body which should exercise the self-control that is so badly needed. To the attainment of this end he thinks that a greater participation by business executives in the affairs of trade associations is necessary. Our old-time fear of monopoly has been supplanted by our fear of unrestricted competition, which, if uncontrolled, may result in anarchy. An impartial research agency, free from political and business control or influence, is the proper body for correcting present evils, he believes. He contends that no one knows what is necessary to attain stability and that the subject must be approached experimentally. He holds, further, that isolated programs, affecting single industries only, are useless, since the entire economic system must be controlled. Competent specialists are needed and their work must be continuous and unhampered by special interests. Such an organization would continue its study of the general problems and cooperate with trade associations in studying and correcting special and general evils. Economic control, says Dr. Watkins, is our greatest problem.



Attractive colored display of Stephens-Adamson Mfg. Co.

WILLARD T. CHEVALIER, who spoke on *Where Do We Go from Here?* at the opening session of the convention, pointed out the difficulty of getting business men to support a body as Dr. Watkins suggested, because of the likelihood—even, perhaps, the certainty—that findings would often be unfavorable to them. He considers it difficult to control competition and to stifle initiative



Operating model of walking drag-line and full-size drag-line bucket exhibited by Bucyrus-Erie Co.

and impracticable to say to men generally, "Thou shalt not enter this business."

As O. W. Irwin (Truscon Steel Co., Youngstown, O.) was prevented by illness from attending the convention, his talk on *How to Get Along with Your Competitors* was not given.

The reports on business conditions, made by some of the association's members at the chair's request, indicated considerable hopefulness for this year. According to some reports, 1931 business was only half as great as 1930 business, although most reports recorded a higher percentage. The outlook for this year is decidedly better in most of the territories on which reports were offered. One producer reported that a local price-war had extinguished the price-cutters and thus clarified the competitive situation.

H. P. CALDWELL (Ohio River Sand & Gravel Co., Louisville, Ky.) drew attention to the filing of a bill which would give Congress the power to prohibit the private use of waterways for the transport by the producer of the producer's own product. The bill, which is discussed elsewhere in this issue, bears the designation S. 1963 and was introduced by Hiram W. Johnson (California) who is the chairman of the Senate Committee on Commerce, to which the bill has been referred. Mr. Caldwell urged his fellow members to take immediate action by telegraphing their opposition to their senators and representatives in Congress. He pointed out that, if the bill should become law, it would be unlawful to dig and transport one's own sand and gravel. In his opinion, the bill seems designed to aid the common carriers.

AT the Friday morning session, presided over by H. V. Owens (Eastern Rock Products, Inc., Utica, N. Y.), the first paper was *The Various Combinations of Asphalt and Gravel for Road and Street Surfacing*, prepared by Bernard E. Gray, highway engineer, Asphalt Institute, New York, N. Y. As Mr. Gray was unfortunately unable to attend this meeting his paper was read by C. N. Conner, engi-

neer-executive, American Road Builders' Assn., Washington, D. C. The paper opened with the statement that a gravel road, if made right, had many advantages, and cited a 31-year-old gravel road in New England as an example. Gravel roads built on mid-west gumbo, said Mr. Gray, often sank as far as 6 ft. into the ground but, when covered with an asphaltic surface, became stable because of the exclusion of water and the fact that this gumbo has a low capillarity.

When a road carries 300 to 400 vehicles daily, the gravel should be given an asphalt coating, according to Mr. Gray, in order to prevent rapid deterioration. Crushed gravel, he said, should be used for the cover coat and cut-back asphalt, varying from $\frac{1}{4}$ to $\frac{1}{3}$ gal. per sq. yd., should be used in order to make a waterproof surface which will serve satisfactorily. A second coat applied later also helps.

Mr. Gray discussed the higher types of surfaces for roads, where the traffic is extremely heavy, and gave precautions to be observed and methods to be used in their construction. The road-mix type of pavement, said Mr. Gray, has the advantages of low cost, rapid construction, and unsurpassed smoothness. Asphaltic-concrete roads of the hot-mix type are a higher type of road but considerably more expensive. Crushed aggregates, said Mr. Gray, add stability to any of these roads and he recommended gradings to be used for the various courses. He then cited specifications being used in California, where large amounts of asphaltic concrete are being used for widening and resurfacing concrete and other types of roads. This work is being done at a low cost and necessitates closing the roads for only very short periods. Mr. Gray also described the cold-mix asphaltic concretes and their advantages and discussed the use of portable plants for making this product. In his opinion, more road work will be done in the next 10 yr. than in the past 10, but much of this will be of the lower types of roads. In conclusion he gave a number of tables comparing the costs of construction and maintenance of the various types of roads now in use.



Allen Cone & Machy. Co. booth with sand cone in operation at right.

In Mr. Conner's discussion of the paper, which he had just completed reading, he said that the cost of road construction is rapidly decreasing, due to the improved methods in use and to the fact that low-cost roads are increasing in popularity. He also cited instances where uncrushed gravel is being used successfully in bituminous roads and quoted the specifications for this material in Du Page County, Ill., where it is being extensively used. He also described the methods and types of equipment being used in placing this material.

J. P. Lucas (McClain Sand Co., Morgantown, W. Va.) said that gravel producers should first begin the production of macadam aggregates in order to gain entry to this market, which has used slag

as the bitumens used for this type of work and said that he was confining his paper to the characteristics of and the developments in the making of the first two of these materials.

He advised that gasoline cut-back asphalt be used only where no great penetration is required and described the use of emulsions and wet aggregates which allow this type of pavement to be laid even in bad weather. He said that he prefers crushed aggregates for bituminous pavements where any amount of stability is required, but cited cases where uncrushed gravel has been used successfully. In conclusion he mentioned the bad effects resulting from the use of highly-absorptive stone and discussed the natural limitations of certain materials with which he is familiar.



Electric motor, bearings and V-belt drive exhibited by the Allis-Chalmers Mfg. Co.

and crushed stone almost exclusively up to the present time. He advised that efforts also be made to mix 50-per cent. gravel with slag or stone in order to secure some of this business. In his opinion the gravel producer must install additional equipment in his plant to meet the trend toward the use of manufactured gravel. A. G. Bennett (Consolidated Sand & Gravel Co., Toronto, Can.), in discussing the use of this material in Canada, said that straight-gravel roads have proved entirely successful in his territory but that there is a steady demand for crushed gravel, which his company is able to supply because in its deposits there is a large amount of "oversize" which requires crushing of from 35 to 40 per cent. of the material produced. He then briefly described two of the company's plants which have separate screening and storage facilities for the crushed and uncrushed materials.

W J. EMMONS, director, Michigan State Highway Laboratory, Ann Arbor, Mich., presented a paper entitled, *Effect of Characteristics of Bituminous Materials on Applicability to Different Types of Aggregates*. This paper, said Mr. Emmons, could have been more suitably called *Bituminous Materials for Use in Highway Work*. He named petroleum tar, and natural and rock asphalts

THE last speaker on the program was E. M. Fleming, manager, Highways and Municipal Bureau, Portland Cement Assn., Chicago, Ill., who addressed the gathering on the *Use of Concrete in Stage Construction of Highways*. Before entering upon the subject of his paper, Mr. Fleming pointed out that a comparison of the costs of various types of roads must include not only the first cost but the maintenance, upkeep, repairs, etc., and that the added car wear of low-cost roads should also be considered. He cited figures compiled by the Pennsylvania Highway Department, over a period of years on the up-keep of various types of roads in support of his contention that concrete roads are most economical in the long run, except where the traffic is extremely light.

He stated that more new concrete pavement was laid in 1931 than in the preceding year. He then compared the highway-maintenance costs in two states having similar weather and geographical conditions, one using concrete pavement almost exclusively and the other bituminous, brick, and other types. These showed a great saving in maintenance cost in favor of the concrete. Single-lane concrete pavement, where the traffic does not justify a full-width pavement, has many advantages, according to Mr. Fleming. When desired, it can readily be widened. He cited the experience of a number of different states using this method and showed pictures of some of these roads.

Because of the extent to which the morning session overran the time allotted to it, the afternoon session was cut short. The first of the two papers scheduled to be presented was the *Use of Gravel for Railway Ballast*, by Charles B. Stanton, associate professor of civil engineering, Carnegie Institute of Technology. As Professor Stanton has for several years been chairman of the subcommittee on gravel ballast of the American Railway Engineering Assn., he is well qualified to speak on this subject. He first gave a brief review of the progress made in ballast specifications and compared a typical specification made in 1905 with a current specification to illustrate the increasingly-stringent requirements the gravel producer is called upon to meet. He cited the fact that angular materials are

considered to be superior for this purpose, and advised the producers and the association to give this serious consideration. In speaking of the progress made by his committee on this subject, he expressed his appreciation of the manner in which the association and the individual producers have cooperated in furnishing assistance and information toward the solving of their problems.

The second paper was *Practical Safety Methods Applied to the Sand-and-Gravel Industry*, by H. W. Heinrich, assistant superintendent, Engineering and Inspection Division, The Travelers' Insurance Co., Hartford, Conn. Mr. Heinrich stressed the tremendous financial burden of the sand-and-gravel industry caused by the number of accidents to its employees each year. He quoted figures showing that this industry each year had an accident cost equivalent to 15 per cent. of its pay-roll and 4.3 per cent. of its income. These figures, he maintained, could be reduced 50 per cent. by employing certain practical methods which have been proved successful.

The reports of the various association committees were submitted, the subjects including: Census of the sand-and-gravel industry; standard specifications; uniform cost-accounting; and resolutions. Reports were also made by V. P. Ahearn, executive secretary, and Stanton Walker, director, Engineering and Research Division, and the board of directors.

NEW officers of the association were then elected, Harold V. Owens (Eastern Rock Products, Inc., Utica, N. Y.) succeeding Robert J. Potts as president. J. C. Buckbee (Northern Gravel Co., West Bend, Wis.) was elected vice-president to succeed Mr. Owens; Otto S. Conrades (St. Louis Material & Supply Co.) was elected a member of the executive committee to succeed Mr. Buckbee; Harry S. Davison (J. K. Davison and Bros., Pittsburgh, Pa.) was reelected secretary-treasurer. All the other members of the old executive committee were reelected. These are: Paul P. Bird (Boston Sand & Gravel Co., Boston, Mass.), Alexander Foster, Jr. (Warner Co., Philadelphia, Pa.), and Frank W. Peck (Peck-Thompson Sand & Material Co., Kansas City Mo.), Otto Kuehne, Jr. (Kansas Sand Co., Topeka, Kan.) and R. J. Windrow (Dallas Washed & Screened Gravel Co., Dallas, Tex.) were elected directors at large.

A PROGRAM of amateur boxing bouts, followed by a buffet supper, was well attended on the opening night. It was the offering of the Pittsburgh members and was universally praised for its general appeal. A speechless banquet, enlivened by a scientific demonstration presented by the General Electric Co. and dancing, drew a large and appreciative crowd on Thursday night. The conversion of sound into light and back into sound was perhaps the most fascinating feature of the electrical demonstration. The amplification of the very weak electric current present in the human body to a strength sufficient to light two ordinary incandescent lamps was demonstrated by the use of an

Aten quadrillion-fold tube. The absence of speeches and a speakers' table encouraged a free mingling of those in attendance and was the means of widening the acquaintanceship of everyone present.

For the pleasure of the ladies an attractive program was arranged. The outstanding feature was a visit to the Sewickley residence of Mrs. Ralph Dravo, where the ladies had lunch and listened to a reading of Barrie's *What Every Woman Knows*, given by Mrs. Mary Jones Sherrill. Each visitor was the recipient of a large box of delicious candy presented by Mr. Dravo. A bridge party, an impromptu piano recital by Mrs. Stanley A. Phillips, and visits to the plant of the H. J. Heinz Co., and the department stores filled the daylight hours of the first and last days. The boxing bouts attracted a large number of ladies, some of whom expressed themselves as pleasantly surprised and considerably broadened by a type of spectacle that was new to them.

Description of Exhibits

Allen Cone & Machy, Corp., New York, N. Y.

An operating model of an Allen cone and tank used for classifying and dewatering concrete, mason and plaster sands. Photographs and literature and samples of the various sizes of sands made, including asphalt sand.

Allen-Sherman-Hoff Co., Philadelphia, Pa.

A full-sized Type R.H.C. Hydroséal dredging pump, a large cross-section panel showing the construction and operating principle of the pump, and photographs and literature.

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

A photographic display of the Newhouse crusher and vibrating screens. Also an inclosed fan-cooled motor, a Texrope drive, a display of Rollway cylindrical roller-bearings, and descriptive literature.

American Manganese Steel Co., Chicago Heights, Ill.

A model of the Type H Amsco centrifugal dredge pump, two Type C anti-friction pump bearings cut to show their internal construction, cast-manganese drag-chain, manganese-steel pipe fittings, sheaves, dipper teeth, flop valve, and an operating model of an Eagle Swintek ladder. Also a photographic display of all products and literature.

Blaw-Knox Co., Pittsburgh, Pa.

Transparent operating models of agitator and mixing trucks, and a miniature operating model of a clam-shell bucket. Photographic display of ready-mixed-concrete plants, truck-mixers and agitators and clam-shell buckets, and literature.

Bucyrus-Erie Co., South Milwaukee, Wis.

An operating model of a walking drag-line and a full-size drag-line bucket built of unit castings, alloy steels inserted, reversible teeth and a renewable bottom plate. Also photograph display panels and a complete line of literature.

Chain Belt Co., Milwaukee, Wis.

A motion picture showing Rex Moto-Mixer and agitator trucks delivering concrete to bridge, paving, highway, and foundation work in Illinois, Massachusetts, Pennsylvania, New Jersey, and Wisconsin. Also a section of an apron-conveyor, and belt-conveyor idlers and a photographic display of plants and trucks.

Cross Engineering Co., Carbondale, Pa.

Samples of carbon- and manganese-steel perforated screen plates of all sizes and types, and descriptive literature.

Dorr Co., Inc., New York, N. Y.

Photographic panel of sand-washers and clarifiers and plants in which these are used, as well as descriptive literature.

Dravo Contracting Co., Pittsburgh, Pa.

Photographic display of various dredges and tug-boats, and literature.

Eagle Iron Works, Des Moines, Ia.

Large operating models of a sand-and-gravel washer and dewaterer and an improved type of Eagle Swintek screen-nozzle ladder. Also photographic panels showing dredges, ladders, washers, valve sand-classifier, and other equipment. Literature.

Fate-Root-Heath Co. (Plymouth Locomotive Works), Plymouth, O.

Attractive black-and-gold curtain display and photographs of various types and sizes of locomotives. Descriptive literature.

General Electric Co., Schenectady, N. Y.

Exhibited Thyatron-tube organ, Aten quadrillion-fold amplifier, thruster, photoelectric relay, Thyatron-tube speed-trap, and a totally inclosed fan-cooled motor. Literature. This was one of the most popular of the exhibits.

Hardinge Co., Inc., York, Pa.

Attractive operating models of conical scrubber and screen with clarifier and a full-size constant-weight feeder. Also photographs and descriptive literature.

Harnischfeger Sales Corp., Milwaukee, Wis.

Motion picture of shovel in operation; photographs, and descriptive literature.

Hendrick Mfg. Co., Carbondale, Pa.

Display racks of various sizes and types of perforated-metal screen-plates and descriptive literature.

Hetherington & Berner, Inc., Indianapolis, Ind.

Miniature operating models of dredge pump and patented bottom-discharge stone-trap which takes out oversize material before it goes into the dredge pump. Also photographic display of pumps, dredge hulls, dredges, stone-trap, etc. Descriptive literature.

Hug Co., Highland, Ill.

Motion picture of agitator truck bodies in operation, a glass operating model of a spring-blade agitator truck, and a photographic panel. Also descriptive literature.

Hummel-Ross Fibre Corp., Philadelphia, Pa.

Models of box-cars showing the use of liners; large photograph showing sheet of fiber sustaining the weight of a locomotive; samples of fiber and literature.

Jaeger Machine Co., Columbus, O.

Photographic panel of truck-mixers and agitators in operation, and descriptive literature.

Kensington Steel Co., Chicago, Ill.

Photographic display of dipper teeth, elevator buckets, sprockets, chain, hammer-mill parts, etc., and literature.

A. Leschen & Sons Rope Co., St. Louis, Mo.

Samples of various sizes and types of wire cable, photographs of cable in use, and descriptive literature.

Link-Belt Co., Chicago, Ill.

Photographic display of plants and equipment, model Shaw classifier, sample conveyor idlers, full-sized cut-away speed-reducer, section of a pan-conveyor, and full-size single-deck vibrating screen. Literature.

Ludlow-Saylor Wire Co., St. Louis, Mo.

Wall rack and revolving-stand display of various sizes and types of wire screen cloth. Descriptive literature.

McLanahan & Stone Corp., Hollidaysburg, Pa.

Full-size steel single-roll crusher; operating model of log-washer. Photographs and literature.

Manganese Steel Forge Co., Philadelphia, Pa.

Samples of various sizes and types of both manganese and new hardened-and-tempered-steel screen cloths, and literature. Also sample decks of Rol-man rib screen for heavy scalping service and rib screen with removable screen bars which can be replaced when worn out.

Manheim Mfg. & Belting Co., Manheim, Pa.

Samples of various sizes of transmission, conveyor, and elevator balata belting.

Marion Steam Shovel Co., Marion, O.

Photographic display of shovels in operation and descriptive literature. Souvenirs piped in the form of shovel dippers.

Morris Machine Works, Baldwinsville, N. Y.

Exhibited take-down model of Type H dredge pump, large photograph of dredge and literature on slurry, water and dredge pumps, complete dredges, etc.

National Equipment Corp., Milwaukee, Wis.

Photographic display of installations, concrete mixers, mixer-trucks, shovels, dippers, etc. Also miniature operating model illustrating mixing action of Smith truck-mixer body. Literature.

National Safety Council, Chicago, Ill.

Attractive display board of safety pamphlets and literature centered about a bronze safety trophy.

National Sand & Gravel Assn., Washington, D. C.

Booth in prominent location at the entrance to the exhibition hall with copies of publications, pamphlets, etc. Someone in constant attendance to take registrations and give information to visitors.

Niagara Concrete Mixer Co., Buffalo, N. Y.

Large double-deck roller-bearing screen in operation, a small operating model screen and sample bearings. Also photographs showing screens in operation, and descriptive literature.

Nordberg Mfg. Co., Milwaukee, Wis.

Cross-sectional operating model of Symons cone crusher showing its method of operation and a complete miniature in operation. Also a photographic display and literature.

Ohio Power Shovel Co., Lima, O.

Large photographic display of shovel in operation and descriptive literature.

PIT AND QUARRY, Chicago, Ill.

Copies of the Annual Sand and Gravel Section, the Annual Engineering and Review Number, and the PIT AND QUARRY HANDBOOK AND DIRECTORY.

H. K. Porter Co., Pittsburgh, Pa.

Photographic panel of steam, gas-electric, oil-electric, and fireless steam locomotives, and literature.

Robins Conveying Belt Co., New York, N. Y.

Photographic display panel of plants built recently and of vibrating screens, apron-feeders, belt-conveyors, elevators, roll grizzlies, automatic trippers, gates, and other equipment. Also a set of conveyor idlers and literature.

Rock Products, Chicago, Ill.

Copies of Annual Review Number, *Concrete Products*, and other literature.

John A. Roebling's Sons Co., Trenton, N. J.

A complete and attractive display of Jersey Abraso E. E. spring-steel screen cloth and sample sections of various sizes and types of steel cable. This exhibit also contained a cross-section of one of the main cables supporting the new George Washington Bridge across Hudson River.

Sauerman Bros. Inc., Chicago, Ill.

Operating models of cableway excavator, Crescent scraper operated with the usual hoist and posts, and one operated by a crawler crane. Also descriptive literature.

Simplicity Engineering Co., Durand, Mich.

Full-size new Model B double-deck vibrating screen in operation. This screen is direct-driven and has new resilient rubber mountings and a compensator on the drive-shaft for adjusting to load. Photographs and literature of screens and disintegrator.

Smith Engineering Works, Milwaukee, Wis.

Photographic panel display of vibrating screens and other equipment, and a complete assortment of literature.

Stephens-Adamson Mfg. Co., Aurora, Ill.

Attractive colored and illuminated panel of new ready-mixed-concrete plant and photographs of plants, conveyors, feeders, screens, grizzlies, etc. Literature.

Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

Samples of manganese-steel dipper teeth, sheaves, crawler treads, chain, elevator buckets, crusher concaves, and Timang woven-wire screen cloth. Literature.

Thew Shovel Co., Lorain, O.

Photographic display and literature covering complete line of shovels, cranes, drag-lines, etc.

Transit Mixers, Inc., Oakland, Cal.

Photographs of various fleets of mixer-trucks and the plants in which they are used. Also photographs of Ransome plant mixers and a complete line of literature.

W. S. Tyler Co., Cleveland, O.

Panel display of various types and sizes of screen cloth, photographs, and literature. Also Ro-Tap sieve shaker, Hum-mer vibrating screen, and Ty-Lab tester in operation.

United States Bureau of Mines, Washington, D. C.

Photographic display of chief causes of fatalities and injuries and a motion picture on safety methods.

United States Bureau of Public Roads, Washington, D. C.

Complete display of models of various types of brick, concrete, bituminous-concrete, bituminous-macadam, surface-treatment, gravel, stone, and other types of roads so constructed as to illustrate the manner in which they are made. Also models of various types of bridges, culverts, grade separations, etc., built in the same manner.

F. M. Welch Engineering Service, Inc., Greenville, O.

Photographic display of Greenville stackers in operation and attractive miniature operating model of Allswede scrubber.

REGISTRATION

Abel (Norman), Allegheny County, Dept. of Highways, Pittsburgh, Pa.
Abmayr (George J.), McCrady-Rodgers Co., Pittsburgh, Pa.
Adams (James H.), Sturm & Dillard Co., Circleville, O.
Adamson (C. H.), Stephens-Adamson Mfg. Co., Chicago, Ill.
Ahearn (V. P.), National Sand & Gravel Assn., Washington, D. C.
Ahearn (Mrs. V. P.), Washington, D. C.
Ainlay (A. E.), Mid-West Locomotive Wks., Hamilton, O.
Allen (Don M.), Donora Construction Co., Donora, Pa.
Allen (F. B.), Allen-Sherman-Hoff Co., Philadelphia, Pa.
Allison (A. Homer), McCrady-Rodgers Co., Pittsburgh, Pa.
Allison (Raymond L.), McCrady-Rodgers Co., Pittsburgh, Pa.
Allswede (W. H.), Hersey Gravel Co., Hersey, Mich.
Amos, Jr. (A. R.), Philadelphia, Pa.
Andersen (Frank N.), Vassar Sand & Gravel Co., Saginaw, Mich.
Ashcraft (Charles E.), Sauerman Bros., Inc., Chicago, Ill.
Ashcraft, Jr. (C. E.), Sauerman Bros., Inc., Chicago, Ill.
Aulmann (Theodore), Eagle Iron Wks., Des Moines, Ia.
Averill (Walter A.), *Pacific Builder and Engineer*, Seattle, Wash.

Barber (F. D.), Simplicity Engineering Co., Durand, Mich.
Barnes (W. A.), Washington County Commissioner, Washington, Pa.
Barron (W. E.), H. K. Porter Co., Pittsburgh, Pa.
Barth (A. E.), Ohio River Sand & Gravel Co., New Martinsville, W. Va.
Battjes (Dewey F.), Grand Rapids Gravel Co., Grand Rapids, Mich.
Battjes (Henry N.), Grand Rapids Gravel Co., Grand Rapids, Mich.
Bauer (Eugene C.), Kensington Steel Co., Chicago, Ill.
Bauer (P. F.), Allis-Chalmers Mfg. Co., Pittsburgh, Pa.
Beglinger (R. T.), Allis-Chalmers Mfg. Co., Pittsburgh, Pa.
Beler (Robert J.), Smith Engineering Wks., Pittsburgh, Pa.
Bennett (A. G.), Consolidated Sand & Gravel Co., Toronto, Can.
Benson (George H.), Pennsylvania Dept. of Highways, Pittsburgh, Pa.
Berger (J. Fennell), John A. Roebling's Sons Co., Trenton, N. J.
Berninger (W.), A. Leschen & Sons Rope Co., St. Louis, Mo.
Bickel (C. A.), Iron City Sand & Gravel Co., Pittsburgh, Pa.
Bickel (W. D.), Allen-Sherman-Hoff Co., Pittsburgh, Pa.
Bingham (F. A.), Northern Gravel Co., West Bend, Wis.
Bird (Paul F.), Boston Sand & Gravel Co., Boston, Mass.
Bishop (John M.), Good Roads Machinery Corp., Kennett Square, Pa.
Blakemore (A. L.), American Manganese Steel Co., Chicago Heights, Ill.
Bliss (W. A.), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
Bliss (Mrs. W. A.), Pittsburgh, Pa.
Bliss, Jr. (W. Agnew), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
Board (B. C.), Ohio River Sand & Gravel Co., Wheeling, W. Va.
Bohmer (Charles H.), Ohio River Sand Co., Louisville, Ky.
Bornscheuer (Robert), J. K. Davison & Bro., Pittsburgh, Pa.
Borstelmann (L. J.), Greensburg, Pa.
Botten (E. W.), Owen Bucket Co., Cleveland, O.
Bowers (F. L.), McClain Sand Co., Point Marion, Pa.
Bowers (F. M.), McClain Sand Co., Point Marion, Pa.

Bowers (E. S.), McClain Sand Co., Point Marion, Pa.
Boyer (Russell E.), Pennsylvania Dept. of Highways, Pittsburgh, Pa.
Boyles (R. H.), Universal Atlas Cement Co., Pittsburgh, Pa.
Breslove (Joseph), Pittsburgh, Pa.
Buck (Edward M.), PIT AND QUARRY, New York, N. Y.
Buckbee (J. C.), Northern Gravel Co., West Bend, Wis.
Buckheiser (Harry), Niagara Concrete Mixer Co., Wilmington, Dela.
Buckwalter (W. F.), Bay City Shovels, Inc., Pittsburgh, Pa.
Buechler (John A.), Ward Sand & Gravel Co., Oxford, Mich.
Buehler (Charles W.), Smith Engineering Wks., Columbus, O.
Burke (James U.), Ladd Equipment Co., Pittsburgh, Pa.
Burr (E. A.), Cleveland Quarries Co., Cleveland, O.
Buschman (W. A.), PIT & QUARRY, Chicago, Ill.
Buzard (F. J.), Fate-Rooth-Heath Co., Plymouth, O.
Byrne (Edw. J.), J. K. Davison & Bro., Pittsburgh, Pa.

Caldwell (H. P.), Ohio River Sand Co., Louisville, Ky.
Campbell (F. D.), Koppel Industrial Car & Equipment Co., Pittsburgh, Pa.
Carr (Bradley S.), American Manganese Steel Co., Chicago Heights, Ill.
Casey (J. M.), A. Leschen & Sons Rope Co., Pittsburgh, Pa.
Catlow (J. H.), J. H. Catlow Co., Barrington, Ill.
Chaney (George S.), Washington County, Washington, Pa.
Chapman (Eugene Y.), McCrady-Rodgers Co., Pittsburgh, Pa.
Cheney (D. L.), Marion Steam Shovel Co., Marion, O.
Chevalier (Willard T.), *Engineering News-Record*, New York, N. Y.
Chew (Robert E.), Ladd Equipment Co., Pittsburgh, Pa.
Clark (W. E.), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
Clark (W. H.), Oil City Sand & Gravel Co., Oil City, Pa.
Clarke (R. M.), White Rock Silicon Co., Greenville, Pa.
Clementz (Elmer E.), A. J. Clementz Sons, Massillon, O.
Colby (A. C.), Nordberg Mfg. Co., Milwaukee, Wis.
Collins (R. C.), Standard Building Material Co., St. Louis, Mo.
Conner (C. N.), American Road Builders' Assn., Washington, D. C.
Conrades (Otto S.), St. Louis Material & Supply Co., St. Louis, Mo.
Cowan (Wm. W.), Dorr Co., Inc., New York, N. Y.
Crawford (G. N.), Allegheny Equipment Co., Pittsburgh, Pa.
Cullison (W. Rex), McCrady-Rodgers Co., Pittsburgh, Pa.
Cumberland (C. C.), Silica Sand Co., Steelton, Pa.
Curry (Earl P.), Curry Sand & Gravel Co., Pittsburgh, Pa.

Dandridge (E. P.), Stephens-Adamsons Mfg. Co., Aurora, Ill.
Daniels (A. W.), American Manganese Steel Co., Chicago, Ill.
Dann (Alexander W.), Keystone Sand & Supply Co., Pittsburgh, Pa.
Darlington (E. S.), General Electric Co., Schenectady, N. Y.
Davis (A.), Keystone Sand & Supply Co., Pittsburgh, Pa.
Davis (Mrs. N. L.), Pittsburgh, Pa.
Davison (G. M.), J. K. Davison & Bro., Pittsburgh, Pa.
Davison (H. M.), Harnischfeger Sales Corp., Milwaukee, Wis.
Davison (Mrs. H. M.), Milwaukee, Wis.

Davison (H. S.), J. K. Davison & Bro., Pittsburgh, Pa.
Dawson (A. J.), Dravo Contracting Co., Pittsburgh, Pa.
Day (Calvin L.), Robins Conveying Belt Co., Pittsburgh, Pa.
Dellinger (A. V.), Neuman Sand & Supply Co., York, Pa.
Dellinger (Edward B.), Neuman Sand & Supply Co., York, Pa.
Deutsch (J. T.), Allen-Sherman-Hoff Co., Philadelphia, Pa.
Dickson (C. S.), Wheeling Sand & Gravel Co., Wheeling, W. Va.
Diefendorf (A.), University of Pittsburgh, Pittsburgh, Pa.
Dillman (Kenneth W.), Dillman Industries, Inc., Caruthersville, Mo.
Dinardo (Dan), Parkview Construction Co., Pittsburgh, Pa.
Dobson (Duncan C.), Ludlow-Saylor Wire Co., St. Louis, Mo.
Donley (Charles), Pittsburgh, Pa.
Doyle (E. J.), Doyle Gasoline & Oil Co., Inc., Rochester, N. Y.
Driskell (J. W.), Brilliant Sand Co., Steubenville, O.
Duff (W. C.), General Concrete Co., Warren, Pa.
Dulin (G. N.), A. Frederick, Johnstown, N. Y.
Dunkel (Roy C.), Simplicity Engineering Co., Columbus, O.
Dunlap (Clyde M.), Pennsylvania Dept. of Highways, Pittsburgh, Pa.
Du Puis (O. G.), Eagle Iron Wks., Des Moines, Ia.
Durland (D. D.), S. R. Durland Sand Co., Wyoming, Pa.
Earle (Thos. E.), Lake Shore Sand & Gravel Co., Erie, Pa.
Earnshaw (Geo. M.), *Rock Products*, Cleveland, O.
Ebersol (A. R.), A. R. Amos, Jr., Philadelphia, Pa.
Edwards (V. B.), Dravo Contracting Co., Pittsburgh, Pa.
Elliott (Richard), Pennsylvania Dept. of Highways, Pittsburgh, Pa.
Ellis (Geo. C.), Ransome Concrete Machinery Co., Dunellen, N. J.
Emich (P. B.), Ohio Valley Sand Co., New Martinsville, W. Va.
Emmons (W. J.), State Highway Dept., Ann Arbor, Mich.
Escher (E. P.), Stephens-Adamson Mfg. Co., Detroit, Mich.
Evans (J. H.), Sturm & Dillard Co., Circleville, O.
Evans (M. S.), Bureau of Tests, Allegheny Co., Pittsburgh, Pa.
Fasmer (J. J.), Stephens-Adamson Mfg. Co., Detroit, Mich.
Ferver (George W.), Harbor Sand Co., New Castle, Pa.
Fielding (A. E.), Niagara Concrete Mixer Co., Buffalo, N. Y.
Finch (F. E.), Harding Co., York, Pa.
Firle (N. A.), Pennsylvania Dept. of Highways, Pittsburgh, Pa.
Firle (Victor), Pennsylvania Dept. of Highways, Pittsburgh, Pa.
Fischer (Otto R.), Eastern Sand & Gravel Corp., Philadelphia, Pa.
Fisher (W. A.), River Sand Co., Steubenville, O.
Fitzgerald (Leonard), Hummel-Ross Fiber Corp., Hopewell, Va.
Fitzpatrick (Jos. F.), Fitzpatrick Sand & Gravel Co., Worcester, Mass.
Fleming (E. M.), Portland Cement Assn., Chicago, Ill.
Flounders (G. W.), Nordberg Mfg. Co., New York, N. Y.
Foeller (Carl P.), Niagara Concrete Mixer Co., Butler, Pa.
Fonde (Chas. H.), Cherokee Sand & Gravel Co., Knoxville, Tenn.
Foringer (W. E.), John A. Roebling's Sons Co., Trenton, N. J.
Foster, Jr. (Alexander), Warner Co., Philadelphia, Pa.

Foster (C. B.), Harnischfeger Sales Corp., Milwaukee, Wis.
 Foster (L. E.), Marion Steam Shovel Co., Marion, O.
 Fowler (Harry W.), Allegheny County Dept. of Highways, Pittsburgh, Pa.
 Fowler (W. A.), Jaeger Machine Co., Pittsburgh, Pa.
 Fowler (William H.), Dravo Contracting Co., Pittsburgh, Pa.
 Fowler (Mrs. William H.), Pittsburgh, Pa.
 Fox (George J.), George J. Fox Co., Greensburg, Pa.
 Fox (William A.), City of Pittsburgh, Pittsburgh, Pa.
 Fraas (Henry C.), Jaeger Machine Co., Columbus, O.
 Frack (P. D.), Good Roads Mch. Corp., Kennett Square, Pa.
 Freeman (P. J.), Allegheny County, Pittsburgh, Pa.
 Frosch (A. E.), Eastern Ohio Sand & Supply Co., East Liverpool, O.
 Fugate, Jr. (H. M.), Hollywood Beach Hotel & Golf Club, Hollywood, Fla.
 Fuller (F. C.), Portsmouth Sand & Gravel Co., Portsmouth, O.
 Fullerton (Mrs. J. N.), New Castle, Pa.
 Gallagher (John J.), Goodwin-Gallagher Sand & Gravel Corp., New York, N. Y.
 Garber (M. B.), Thew Shovel Co., Lorain, O.
 Garrettson (R. R.), Dept. of Highways, Pittsburgh, Pa.
 Gass (K. W.), Stephens-Adamson Mfg. Co., Pittsburgh, Pa.
 Gebhardt (Edw. C.), Macwhyte Co., Pittsburgh, Pa.
 Gemmer (W. H.), Texas Construction Material Co., Houston, Tex.
 Gerstron (C. G.), Dept. of Public Works, Argentine Republic, Washington, D. C.
 Giles (M. S.), Iron City Sand & Gravel Co., Pittsburgh, Pa.
 Gilkey (Thomas A.), Nashua Sand & Gravel Co., New Castle, Pa.
 Gilkey (Mrs. Thomas A.), New Castle, Pa.
 Goedocke (William), Robins Conveying Belt Co., New York, N. Y.
 Goetz (R. W.), Blaw-Knox Co., Blaw-Knox, Pa.
 Goldberg (Abe), Allis-Chalmers Mfg. Co., Milwaukee, Wis.
 Gombert (J. P.), Mellon-Stuart Co., Pittsburgh, Pa.
 Goodman (F. T.), Goodman Engine & Machine Co., Pittsburgh, Pa.
 Gourley (A. A.), Oil City Sand & Gravel Co., Oil City, Pa.
 Gray (E. M.), Des Moines Sand & Gravel Co., Des Moines, Ia.
 Gray (Latham B.), Eastern Rock Products, Inc., Utica, N. Y.
 Greenman (Russell S.), Albany, N. Y.
 Grimshaw (C. V.), Woodlawn Sand Co., Alliquippa, Pa.
 Grindall (Geo. E.), Wyoming Sand & Stone Co., Falls, Pa.
 Groh (F. W.), Allegheny County, Pittsburgh, Pa.
 Guilfoil (D. D.), Sauerman Bros., Inc., Chicago, Ill.
 Guthrie (George), Oak Hill Gravel Co., Springfield, O.
 Hacker (J. F.), Chain Belt Co., Milwaukee, Wis.
 Haggerty (F. J.), General Concrete Products Corp., Warren, Pa.
 Hall (R. F.), West Baden, Ind.
 Halt (W. J.), Jaeger Machine Co., Columbus, O.
 Hankey (E. B.), Pennsylvania Railroad Co., Pittsburgh, Pa.
 Harman (J. W.), Ohio Valley Sand Co., New Martinsville, W. Va.
 Harris (W. G.), Rubber City Sand & Gravel Co., Akron, O.
 Harsch (E. C.), *Rock Products*, Chicago, Ill.
 Hastings (F. S.), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
 Hawkins (J.), Dept. of Highways, Pittsburgh, Pa.
 Heagy (L. N.), Pennsylvania Dept. of Highways, Harrisburg, Pa.
 Heftt (Has. S.), Robins Conveying Belt Co., Pittsburgh, Pa.
 Heinrich (H. W.), Travelers' Insurance Co., Hartford, Conn.
 Henry (Murray H.), Bureau of Tests City of Pittsburgh, Pittsburgh, Pa.
 Hicks (Hugh), Ohio Valley Sand Co., North Martinsville, W. Va.
 Hill (J. Rutledge), Gifford-Hill & Co., Inc., Dallas, Tex.
 Hippert (A. F.), Keystone Sand & Gravel Co., Pittsburgh, Pa.
 Hise (Carl M.), Missouri Valley Sand & Gravel Assn., Kansas City, Mo.
 Hissrich (Henry R.), Goodman Engine & Machine Co., Pittsburgh, Pa.
 Hoffman (W. G.), American Manganese Steel Co., Chicago Heights, Ill.
 Hoffner (L. O.), Hoffner Sand & Gravel Co., Canton, O.
 Holmes (N. B.), Pittsburgh Plaster & Supply Co., Pittsburgh, Pa.
 Hooper (Arnold), Blaw-Knox Co., Blaw-Knox, Pa.
 Hopatin (N. V.), Amtorg Trading Corp., New York, N. Y.
 Hower (J. Shuman), Utica, N. Y.
 Hubbard (Fred), Standard Slag Co., Youngstown, O.
 Huggans (J. E.), Sand & Gravel Co. of Pittsburgh, Pa.
 Hukill (W. J.), Brilliant Sand Co., Steubenville, O.
 Huntington (C. S.), Link-Belt Co., Chicago, Ill.
 Hurst (J. I.), Hetherington & Berner, Inc., Indianapolis, Ind.
 Hyams (H. H.), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
 Ibe (Herman A.), Houston Star Co., Pittsburgh, Pa.
 Ingram (W.), Mid-West Locomotive Wks., Hamilton, O.
 Irvine (Ralph W.), J. K. Davison & Bro., Pittsburgh, Pa.
 Irwin (J. J.), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
 Jackman (Jos. E.), McCrady-Rodgers Co., Pittsburgh, Pa.
 Jackson (F. H.), U. S. Bureau of Public Roads, Washington, D. C.
 Jackson (R. U.), Robins Conveying Belt Co., Pittsburgh, Pa.
 Johnson, Jr. (Henry D.), City of Pittsburgh, Pittsburgh, Pa.
 Johnson (J. Ellmer), County Commission, Washington County, Pa.
 Johnson (R. C.), Simplicity Engineering Co., Durand, Mich.
 Johnston (V. O.), Lincoln Sand & Gravel Co., Lincoln, Ill.
 Jones (F. H.), Dorr Co., Inc., New York, N. Y.
 Jones (Harold G.), Michigan Wire Cloth Co., Detroit, Mich.
 Jones, Jr. (L. W.), Manganese Steel Forge Co., Philadelphia, Pa.
 Jones (Rowland), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
 Jones (Victor H.), Smith Engineering Wks., Milwaukee, Wis.
 Kay (Delbert), Nordberg Mfg. Co., Milwaukee, Wis.
 Keisting (B. H.), Dravo Contracting Co., Pittsburgh, Pa.
 Kelly (J. W.), Purdue University, Lafayette, Ind.
 Kelly (R. M.), Eastern Rock Products, Inc., Utica, N. Y.
 Kendrick (James A.), J. K. Davison & Bro., Pittsburgh, Pa.
 Keogh (J. K.), Allis-Chalmers Mfg. Co., Pittsburgh, Pa.
 Kern (Fred T.), Fred T. Kern Co., Milwaukee, Wis.
 Kerr (George W.), Ohio Division Highways, Newark, O.
 Kerr (W. C.), Smith Engineering Wks., Kessler (E. D.), H. J. Stannert Sand Co., Northumberland, Pa.
 Kinnaird (W. D.), Hetherington & Berner, Inc., Indianapolis, Ind.
 Kirkendall (F. B.), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
 Klarman (H. J.), Morris Machine Wks., Baldwinville, N. Y.
 Kloss (H. E.), State Dept. of Highways, Pittsburgh, Pa.
 Klyne (Paul S.), Columbus, O.
 Knauff (W. K.), State Road Commission, Clarksville, W. Va.
 Knopel (Herbert J.), Warner Co., Philadelphia, Pa.
 Kochman (E. F.), Allis-Chalmers Mfg. Co., Milwaukee, Wis.
 Koehring (Robert C.), National Equipment Corp., Milwaukee, Wis.
 Kuehne, Jr. (Otto), Kansas Sand Co., Topeka, Kan.
 Kurtz (Harold R.), John A. Roebling's Sons Co., Trenton, N. J.
 LaClair (Cameron), Hankins Paulson Co., Uniontown, Pa.
 Ladner (J.), General Concrete Products Co., Warren, Pa.
 Ladner (L.), General Concrete Products Co., Warren, Pa.
 Laird (C. B.), Eagle Iron Wks., Des Moines, Ia.
 Lambert (Max S.), Robins Conveying Belt Co., Chicago, Ill.
 Lance (A. H.), Taylor Wharton Iron & Steel Co., High Bridge, N. J.
 Lanz (George H.), George Lanz & Sons, Pittsburgh, Pa.
 Larry (H. F.), Allegheny County Board Bureau, Pittsburgh, Pa.
 Laufer (Paul P.), Krystal Rock Products & Supply Co., Brunen, O.
 Lee (N. P.), Treasury Dept., Pittsburgh, Pa.
 Legler (C. H.), Allis-Chalmers Mfg. Co., Pittsburgh, Pa.
 Lehman (George N.), Dept. of Public Wks., Pittsburgh, Pa.
 Leigh (A. C.), Dravo Contracting Co., Pittsburgh, Pa.
 Leigh (Mrs. A. C.), Pittsburgh, Pa.
 Lewin (John C.), Dow Chemical Co., New York, N. Y.
 Lick (Karl W.), General Material Co., St. Louis, Mo.
 Lobert (F. J.), Dept. of Highways, Allegheny Co., Pittsburgh, Pa.
 Loughry (J. B.), Elyria, O.
 Love (H. J.), National Slag Assn., Cleveland, O.
 Lucas (Jos. P.), McClain Sand Co., Morgantown, W. Va.
 Lucas (T. F.), McClain Sand Co., Morgantown, W. Va.
 Lyle (W. C.), Allegheny Co., Bureau of Highways, Pittsburgh, Pa.
 McAuliffe (Pierce J.), Morris Machine Wks., New York, N. J.
 McCall (A. R.), McCrady-Rodgers Co., Pittsburgh, Pa.
 McCandless (L. C.), University of Pittsburgh, Pittsburgh, Pa.
 McCrady, Jr. (James H.), McCrady-Rodgers Co., Pittsburgh, Pa.
 McCrady (John B.), McCrady-Rodgers Co., Pittsburgh, Pa.
 McDiarmid (R. C.), Pittsburgh Gravel Co., Pittsburgh, Pa.
 McDowell (R. V.), Allegheny County, Wilkinsburg, Pa.
 McKenzie (C. L.), Duquesne Slag Products Co., Pittsburgh, Pa.
 McKnight (L. B.), Stearns Conveyor Co., Cleveland, O.
 McLanahan (J. C.), McLanahan & Stone Corp., Hollidaysburg, Pa.
 McLanahan (Ward), McLanahan & Stone Corp., Hollidaysburg, Pa.
 McLaughlin (J. L.), Hug Co., Highland, Ill.
 McLean (R.), Transit Mixers, Inc., Dunellen, N. J.
 McMillin (F. D.), Lehigh Portland Cement Co., Wheeling, W. Va.
 McMillin (E. R.), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
 McMullin (R. A.), Stephens-Adamson Mfg. Co., Boston, Mass.
 McNally (T. H. R.), Toronto Convention & Tourist Assn., Toronto, Can.
 McNiff (Jim), Duquesne Light Co., Pittsburgh, Pa.
 Maier (Benjamin F.), Clarence Sand & Gravel Co., Inc., Buffalo, N. Y.
 Marcus (Barnett), General Materials Co., Baden, Pa.
 Martin (George E.), Barrett Co., New York, N. Y.
 Mattimore (H. S.), Pennsylvania Dept. of Highways, Harrisburg, Pa.
 Maxfield (E. B.), McCrady-Rodgers Co., Pittsburgh, Pa.
 Maxwell (C. W.), Albany Gravel Co., Inc., Albany, N. Y.
 Maxwell (Mrs. C. W.), Albany, N. Y.
 May (Edwin P.), Union Sand & Gravel Co., Huntington, W. Va.
 Meister (R. F.), Belmont Supply Co., Martins Ferry, O.
 Merrill (W. S.), McCrady-Rodgers Co., Pittsburgh, Pa.
 Metz (G. F.), Hardinge Co., Inc., York, Pa.
 Michaely (L. M.), Columbia Supply Co., Gary, Ind.
 Middleton (R. J.), Continental Motors Corp., Muskegon, Mich.
 Milkowski (Victor J.), Morris Machine Wks., Baldwinville, N. Y.
 Miller (A. E.), Chain Belt Co., Milwaukee, Wis.
 Miller (E. E.), American Aggregates Corp., Massillon, O.
 Miller (Mrs. E. E.), Massillon, O.
 Miller (Edwin I.), General Concrete Products, Inc., Warren, Pa.
 Mitchell (T. J.), Pittsburgh, Pa.
 Moran (J. C.), Iron City Sand & Gravel Co., Pittsburgh, Pa.
 Morganroth (Paul F.), L. W. Yaegle & Sons, Warren, Pa.
 Morton (W. A.), J. C. Morton, Sharpsburg, Pa.
 Motz (R. C.), General Concrete Products Corp., Warren, Pa.
 Mullaugh (J. F.), McCrady-Rodgers Co., Pittsburgh, Pa.
 Mullen (C. F.), Florida Gravel Co., Cleveland, O.
 Murrish (Albert A.), U. S. Bureau of Mines, Pittsburgh, Pa.
 Myers (W. K.), Pennsylvania Dept. of Highways, Pittsburgh, Pa.
 Nagle (Perry), American Manganese Steel Co., Chicago Heights, Ill.
 Neal (R. H.), General Concrete Products Co., Warren, Pa.

- Neil (H. E.), West Sand Co., Muskogee, Okla.
- Neuman (F. W.), Neuman Sand & Supply Co., York, Pa.
- Neville (C. F.), Western Sand & Gravel Co., Terre Haute, Ind.
- Newton (D. B.), Dravo Contracting Co., Pittsburgh, Pa.
- Nichols (R. D.), Jeffrey Mfg. Co., Columbus, O.
- Noelp (J. E.), Newark Sand & Gravel Co., Newark, O.
- Norton (J. R.), Smith Engineering Wks., New York, N. Y.
- O'Brien (M. J.), Bay City Shovels, Inc., Pittsburgh, Pa.
- Olsheski (Frank), J. K. Davison & Bro., Pittsburgh, Pa.
- Osbrow (H. W.), Donora Construction Co., Donora, Pa.
- Owen (A. E.), Niagara Concrete Mixer Co., Cleveland, O.
- Owens (H. V.), Eastern Rock Products, Inc., Utica, N. Y.
- Palmer (Paul D.), McCrady-Rodgers Co., Pittsburgh, Pa.
- Patterson (Frank), Patterson Supply Co., Monongahela City, Pa.
- Paulson (C. G.), Hankins Paulson Co., Uniontown, Pa.
- Payne (G. E.), Pennsylvania Railroad Co., Pittsburgh, Pa.
- Peck (F. W.), Peck-Thompson Sand & Material Co., Kansas City, Mo.
- Peck (Mrs. F. W.), Kansas City, Mo.
- Perry (L. A.), Pioneer Sand & Gravel Co., Seattle, Wash.
- Peters (F. S.), Rock Products, Chicago, Ill.
- Pfeil (P. M.), Iron City Sand & Gravel Co., Pittsburgh, Pa.
- Pfohl (W. C.), McCrady-Rodgers Co., Pittsburgh, Pa.
- Phillips (Frank A.), Bay City Shovels, Inc., Bay City, Mich.
- Phillips (H. F.), Macwhyte Co., Pittsburgh, Pa.
- Phillips (Stanley A.), PIT AND QUARRY, Chicago, Ill.
- Phillips (Mrs. Stanley A.), Chicago, Ill.
- Piggott (Wallace J.), W. S. Tyler Co., Cleveland, O.
- Piper (W. E.), Dorr Co., New York, N. Y.
- Pleasant (A. J.), McCrady-Rodgers Co., Pittsburgh, Pa.
- Poling (C. C.), Cross Engineering Co., Pittsburgh, Pa.
- Pope (F. E.), Pittsburgh, Pa.
- Potter (William E.), McCrady-Rodgers Co., Pittsburgh, Pa.
- Potter (W. H.), Manganese Steel Forge Co., Chicago, Ill.
- Potts (Robert J.), Potts-Moore Gravel Co., Waco, Tex.
- Powell (Stephen C.), Powell Bros., New Kensington, Pa.
- Powers (C.), Eastern Rock Products, Inc., Utica, N. Y.
- Price (J. D. Eyre), Wyoming Sand & Stone Co., Wilkes-Barre, Pa.
- Price (F. W.), Allegheny County Dept. of Highways, Pittsburgh, Pa.
- Pringle (W. D.), W. S. Tyler Co., Cleveland, O.
- Proctor (J. A.), Hazel-Atlas Glass Co., Great Cacapon, W. Va.
- Raff (A. H.), Manheim Mfg. & Belting Co., Chicago, Ill.
- Ragner (William), West Penn Sand & Gravel Co., Pittsburgh, Pa.
- Randle (A. W.), PIT AND QUARRY, Chicago, Ill.
- Reading (R. A.), Macwhyte Co., Chicago, Ill.
- Redding (L. E.), Nickel Plate Sand & Gravel Co., Erie, Pa.
- Reinhold (P. B.), Reinhold & Co., Inc., Pittsburgh, Pa.
- Reinke (F. J.), St. Louis Material & Supply Co., St. Louis, Mo.
- Renwick (George W.), Chicago Gravel Co., Chicago, Ill.
- Reppert (Charles), City of Pittsburgh, Pittsburgh, Pa.
- Reynolds (Lee), Jaeger Machine Co., Pittsburgh, Pa.
- Rhoads (Harold W.), Pennsylvania Dept. of Highways, Pittsburgh, Pa.
- Richards (Jess), Link-Belt Co., Philadelphia, Pa.
- Richmond (J. L.), Union Sand & Gravel Co., Huntington, W. Va.
- Rider (F. A.), F. A. Rider, Inc., Endicott, N. Y.
- Riffner (N. E.), J. C. Morton, Sharpsburg, Pa.
- Robeck (E. J.), Hayward Co., New York, N. Y.
- Roberts (J. M.), McClintic-Marshall Co., Pittsburgh, Pa.
- Roberts (L. R.), Dept. of Highways, Pittsburgh, Pa.
- Robertson (H. S.), Thew Shovel Co., Lorain, O.
- Robie (T. M.), Fairbanks, Morse & Co., Chicago, Ill.
- Robinson (A. P.), Ransome Concrete Machinery Co., Dunellen, N. J.
- Robson (Ernest S.), Ludlow-Saylor Wire Co., St. Louis, Mo.
- Rockwood (N. C.), Rock Products, Chicago, Ill.
- Rodgers (H. Clay), McCrady-Rodgers Co., Pittsburgh, Pa.
- Rodgers (Phil K.), McCrady-Rodgers Co., Pittsburgh, Pa.
- Rodgers (William), McCrady-Rodgers Co., Pittsburgh, Pa.
- Rodgers (W. B.), McCrady-Rodgers Co., Pittsburgh, Pa.
- Root (J. W.), Manganese Steel Forge Co., Detroit, Mich.
- Roos (E. John T.), J. K. Davison & Bro., Glenshaw, Pa.
- Rosser (Robert), Wyoming Valley Ready Mixed Concrete, Wilkes-Barre, Pa.
- Roth (H. F.), Nickel Plate Sand & Gravel Co., Erie, Pa.
- Runkle (Karl H.), General Electric Co., Schenectady, N. Y.
- Russell (R. J.), Hardinge Co., York, Pa.
- Russell (W. H.), Owen Bucket Co., Cleveland, O.
- Salchenberger (F. S.), Morris Machine Wks., Chicago, Ill.
- Saunders (Sherman V.), W. F. Saunders Sons, Inc., Syracuse, N. Y.
- Schaefer (Henry A.), River Sand Co., Steubenville, Pa.
- Schenck (Cyrus F.), J. K. Davison & Bro., New Kensington, Pa.
- Seabright (H. L.), Independent Sand Co., Wheeling, W. Va.
- Seader (Miss M. L.), Allen Cone & Machinery Co., New York, N. Y.
- Seifert (H. L.), H. L. Seabright Co., Wheeling, W. Va.
- Settle (J. M.), Ohio River Sand Co., Louisville, Ky.
- Shannon (W. P.), McCrady-Rodgers Co., Pittsburgh, Pa.
- Sherratt (G. F.), Stearns Conveyor Co., Pittsburgh, Pa.
- Shiely (J. L.), J. L. Shiely Co., St. Paul, Minn.
- Shiely (Mrs. J. L.), St. Paul, Minn.
- Shotton (Bruce G.), Hendrick Mfg. Co., Carbondale, Pa.
- Shugg (L. W.), General Electric Co., Schenectady, N. Y.
- Smith (Charles A.), Oil City Sand & Gravel Co., Oil City, Pa.
- Smith (Forrest E.), Kensington Steel Co., Chicago, Ill.
- Smith (Frank B.), Bucyrus-Erie Co., Pittsburgh, Pa.
- Smith (Harold T.), Seaboard Sand & Gravel Corp., New York, N. Y.
- Smith (Mrs. Harold T.), New York, N. Y.
- Smith, Jr. (George H.), Union Steel Products Co., Albion, Mich.
- Smith (Sylvester), J. K. Davison & Bro., Blaw-Knox, Pa.
- Stannert (H. J.), H. J. Stannert Sand Co., Northumberland, Pa.
- Stanton (Charles B.), Carnegie Institute of Technology, Pittsburgh, Pa.
- Stanton (Mrs. Charles B.), Pittsburgh, Pa.
- Starkweather (E. M.), Beaver Sand Co., Beaver, Pa.
- Stepanian (S.), Arrow Sand & Gravel Co., Columbus, O.
- Stepanian (Mrs. S.), Columbus, O.
- Stevens (E. M.), Fred T. Kern Co., Milwaukee, Wis.
- Stewart (Dr. D. J.), J. K. Davison & Bro., Pittsburgh, Pa.
- Stewart (H. H.), J. K. Davison & Bro., Pittsburgh, Pa.
- Stewart (J. G.), Stephens-Adamson Mfg. Co., Cleveland, O.
- Stewart (J. L.), Universal Atlas Cement Co., Pittsburgh, Pa.
- Stillion (H. D.), Muskingum River Gravel Co., Zanesville, O.
- Stolzenbach, Jr. (C. H.), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
- Stolzenbach, Jr. (Mrs. C. H.), Pittsburgh, Pa.
- Stone (Ben), Merom Gravel Co., Indianapolis, Ind.
- Strube (H. L.), Link-Belt Co., Philadelphia, Pa.
- Stump (W. T.), Standard Sand & Gravel Co., Wheeling, W. Va.
- Stump (Edward C.), Standard Sand & Gravel Co., Wheeling, W. Va.
- Suiter (F. B.), Suiter Transport & Material Co., Manchester, O.
- Suiter (I. L.), Suiter Transport & Material Co., Manchester, O.
- Sutton (R. M.), Iron City Sand Co., Pittsburgh, Pa.
- Swartzlander (T. H.), Pittsburgh, Plate Glass Co., Creighton, Pa.
- Swift (A. C.), Moundsville Sand Co., Moundsville, W. Va.
- Talbot (K. H.), National Equipment Corp., Milwaukee, Wis.
- Taylor (John W.), Macwhyte Co., Philadelphia, Pa.
- Thelan (John), Duquesne Light Co., Pittsburgh, Pa.
- Thompkins (E. S.), Allen Cone & Machinery Co., New York, N. Y.
- Thomson (H. F.), General Material Co., St. Louis, Mo.
- Titzel (John M.), Smith Engineering Wks., Pittsburgh, Pa.
- Toole (Edward O.), Glacier Sand & Stone Co., Islington, Mass.
- Toth (S. M.), McCrady-Rodgers Co., Pittsburgh, Pa.
- Tracy (Bartholomew), Duquesne Slag Products Co., Pittsburgh, Pa.
- Trauffer (W. E.), PIT AND QUARRY, Chicago, Ill.
- Tway (J. R.), Macwhyte Co., Chicago, Ill.
- Tyler (R. Perry), John Roebling's Sons Co., Trenton, N. J.
- Umstad (W. L.), Keystone Portland Cement Co., Philadelphia, Pa.
- Ungar (Frank B.), Ludlow-Saylor Wire Co., St. Louis, Mo.
- Upham (Charles), American Road Builders' Assn., Pittsburgh, Pa.
- Vang (George), Iron City Sand & Gravel Co., Pittsburgh, Pa.
- Vero (Ed), Ed Vero Co., Pittsburgh, Pa.
- Vincent (L. D.), Ohio River Sand & Gravel Co., Parkersburg, W. Va.
- Wagner (J. H.), Eastern Rock Products, Inc., Boomville, N. Y.
- Waite (C. W.), Koenig Coal & Supply Co., Detroit, Mich.
- Walker (Stanton), National Sand & Gravel Assn., Washington, D. C.
- Walsh (Wm. T.), W. T. Walsh Equipment Co., Pittsburgh, Pa.
- Ward (F. B.), Ward Sand & Gravel Co., Oxford, Mich.
- Warren (Ray V.), Western Pennsylvania Sand & Gravel Assn., Pittsburgh, Pa.
- Watkins (N. W.), McCrady-Rodgers Co., Pittsburgh, Pa.
- Watkins (Ralph J.), University of Pittsburgh, Pittsburgh, Pa.
- Webster (Frank), Link-Belt Co., Philadelphia, Pa.
- Welch (F. M.), American Aggregates Corp., Greenville, O.
- Wells (Fred S.), Stephens-Adamson Mfg. Co., New York, N. Y.
- Wertz (Herman), General Concrete Products Co., Warren, Pa.
- Wettlaufer (Sam D.), Niagara Concrete Mixer Co., Buffalo, N. Y.
- Whelan (R. J.), Ohio River Sand & Gravel Co., Parkersburg, W. Va.
- Wicker (Carlton S.), Buffalo Slag Co., Buffalo, N. Y.
- Williams (L. E.), Ray Sand & Gravel Co., Detroit, Mich.
- Williams (George H.), J. K. Davison & Bro., Pittsburgh, Pa.
- Wills (Roy), Ohio Power Shovel Co., Lima, O.
- Wilson (Arthur G.), Indiana Gravel Co., Indianapolis, Ind.
- Winebrenner (S. W.), McCrady-Rodgers Co., Pittsburgh, Pa.
- Winsor (Q. J.), Thew Shovel Co., Elyria, O.
- Withum (A. L.), Bureau of Tests, Pittsburgh, Pa.
- Wolfe (Jack G.), Pennsylvania Dept. of Highways, Pittsburgh, Pa.
- Wolfe (Parker J.), Newark Sand & Gravel Co., Newark, O.
- Wolfe (George), Dravo Contracting Co., Pittsburgh, Pa.
- Woodward (H.), Cross Engineering Co., Carbondale, Pa.
- Wright (H. M.), Aliquippa Borough, Aliquippa, Pa.
- Wyse (F. O.), Bucyrus-Erie Co., South Milwaukee, Wis.
- Yager (P. A.), River Sand & Gravel Co., Owensboro, Ky.
- Yarrington (S. K.), Hendrick Mfg. Co., Carbondale, Pa.
- Yeone (Robert E.), Ketchum, MacLeod & Grove, Pittsburgh, Pa.
- Yon (Charles), Sand & Gravel Co. of Pittsburgh, Pa.
- Young (Charles H.), Landers Morrison Christenson Co., Minneapolis, Minn.
- Young (Mrs. Charles H.), Minneapolis, Minn.
- Zimmelman (M.), Blaw-Knox Co., Blaw-Knox, Pa.

Producers of Pre-Mixed Concrete Focus Attention on Current Problems

Increased Recognition of Product Felt Most Important; Burke Named President

THAT the ready-mixed concrete industry is a manufacturing industry operating modern factories which produce a high-grade, standardized and guaranteed but perishable product under accurate, scientific control was the keynote of the Second Annual Convention of the National Ready Mixed Concrete Assn., Inc., held at the William Penn Hotel, Pittsburgh, Pa., Jan. 25 to 26, 1932. This will be remembered in later years as the convention at which this young and rapidly-growing industry had its fundamental principles and policies determined by a representative group of producers. Because of its newness and of the comparatively-recent pooling of resources, knowledge and experience through the formation of a trade association, this industry must solve many problems which are now being considered in the order of their importance. This convention served to bring out the important problems on which attention will be focused during 1932.

It was also impressed upon those present that central-mixing and truck-mixing plant operators have problems in common, a fact which makes it necessary for them to work together in order to secure increased recognition of their product. All phases of the industry from the testing of materials to sales, haulage and contact with engineers and architects were touched upon, and all the papers and discussions were received with an interest which indicated the eagerness of the progressive operator to assist and share in the advancement of the industry.

The selections of the nominating committees for 1932 included only one change in the list of officers for the previous year. All the nominees were elected without a dissenting vote. The new officers are: J. E. Burke (Ready Mixed Concrete Co., Pittsburgh, Pa.), president; Paul P. Bird (Boston Concrete Corp., Boston, Mass.), vice-president; H. F. Thomson (General Material Co., St. Louis, Mo.), vice-president; R. B. Young (Ontario Ready Mix Concrete, Ltd., Toronto, Ont., Can.), vice-president; A. C. Avril (Avril Tru-Batch Concrete Inc., Cincinnati, O.), secretary; J. L. Shiely (Guaranteed Concrete Co., St. Paul, Minn.), treasurer; Alexander Foster, Jr. (Warner Co., Philadelphia, Pa.), assistant treasurer; V. P. Ahearn, executive secretary, Washington, D. C.; Stanton Walker, director of engineering, Washington, D. C.

THE convention was officially opened at 10:00 a. m., Monday, Jan. 25, by V. P. Ahearn, executive secretary of the association, who introduced J. E. Burke, president. Mr. Burke spoke a few appropriate words of greeting and briefly reviewed

the activities of the association during 1931, and outlined a tentative program for 1932.

The first speaker on the program was Cloyd M. Chapman, consulting engineer, New York City, whose subject was *Ready-Mixed Concrete from the Viewpoint of the Architect and the Engineer*. As vice-president of the American Society for Testing Materials and as chairman of its committee on Concrete and Concrete Aggregates, he is particularly competent to speak on this subject.



ATTENDANCE AT THE CONVENTION

Producing companies' representatives.....	100
(Companies represented, 73)	
Equipment-manufacturers' representatives	57
(Companies represented, 33)	
Trade-publications' representatives	7
(Publications represented, 2)	
Guests	17
(Ladies' present, 5)	
Association employees	3

Total attendance 184

LARGE GROUPS IN ATTENDANCE

	Representatives Present
Producers:	
Sand & Gravel Co. of Pittsburgh.....	5
J. K. Davison & Bro.....	3
General Material Co.....	3
McCrary-Rodgers Co.	3
Ready Mixed Concrete Co. (Pittsburgh).....	3
(Fifteen companies had 2 representatives each, and 53 had 1 each.)	
Equipment Makers and Publications:	
PIT AND QUARRY.....	6
J. A. Roebling's Sons Co.....	5
Blaw-Knox Co.	4
National Equipment Corp.....	3
Stephens-Adamson Mfg. Co.....	3
The Shovel Co.....	3
(Eleven companies had 2 representatives each, and 17 had 1 each.)	



Mr. Chapman first brought out the fact that ready-mixed concrete under good control is uniform and of high quality and can be delivered to a job in better shape than job-mixed concrete. To insure this superiority a source of uniform high-grade aggregates is necessary. He then discussed the various angles from which concrete is viewed by those interested in its use. The engineer, said Mr. Chapman, designs for strength and safety and is interested particularly in the methods of control used. The contractor is mainly interested in the cost and wants workability and regular delivery because of their attendant savings. The owner is interested in all these features, and is the final judge of the results obtained. Thus, a reputation for reliability and the confidence of those using the concrete are the industry's greatest assets.

This paper created an animated discussion which was typical of the interest shown by those present in every phase of this subject. R. B. Young (Ontario Ready Mix Concrete, Ltd., Toronto, Ont.) mentioned some things which are being done in the industry but which are not to its best advantage. The strength design now commonly used often results in a low cement content and the concrete is not as durable as when richer mixes are used. This was evidently a point in which many others were interested and the ensuing debate brought out the fact that a high-grade cement paste is necessary for impermeable and wear-resisting concrete. Designing concrete for minimum strength instead of average strength was considered by all to be the best method.

Ernest A. Hagy, consulting engineer of Cincinnati, advocated the use of stronger concrete than is now the average practice. This results in savings, not only from better workability but allows forms to be stripped sooner, so that the work can progress more rapidly. The use of stronger concrete, said Mr. Hagy, also reduces the size of the columns, beams, etc., in a building and increases the amount of floor space available. He stressed this as one of the principal arguments against the use of concrete in building construction by the proponents of structural steel. Mr. Hagy recommended 2,500 lb. as a minimum strength for unexposed concrete and 3,500 lb. for exposed concrete. J. L. Shiely (Guaranteed Concrete Co., St. Paul, Minn.) and H. F. Thomson (General Material Co., St. Louis, Mo.) brought out the necessity for educating engineers and architects to the present conditions in the use of concrete in the writing of specifications. Mr. Thomson suggested that the association carry on an educational campaign along these lines. He also supported Mr. Hagy on the advantages of using less but stronger concrete. Miles N. Clair, the next speaker on the program, joined in this discussion and said that contractors and building departments are the greatest stumbling blocks to the advancement of the ready-mixed-concrete industry. He also mentioned that in New England efforts are now being made to pass specifications giving minimum cement contents for the various strength concretes. The consensus of opinion of those present was that users of concrete should be educated to recognize quality rather than price. The latter, due to keen competition, constantly decreasing prices and other existing conditions, has been given more consideration than is best for the interests of both producer and user.

Miles N. Clair (Thompson & Lichtner Co., consulting engineer, Boston, Mass.) spoke on *Control Tests of Ready-Mixed Concrete*. Uniform quality, according to Mr. Clair, depends on many factors and can not be obtained without experience and the use of all control facilities. Control of quality must begin with aggregate quality and grading. He advised great care to avoid segregation and recommended the use of several sizes of coarse aggregate to be recombined in the weighing batcher. Tests should be made at the beginning of the day's work and at regular intervals during the day. The

moisture content of the aggregates should be determined at the same time that other tests are made, and the 7-day standard A.S.T.M. cement test should be made before any cement is used. Mixing of brands of cement is not advisable. A table of gradings, showing allowable variations in fineness modulus of aggregates and in the slump and strength of concrete, was presented.

Mr. Clair said that the design of the plant and its various operations is important. All materials, including water, should be weighed to get the best results. Always keeping the bins as full as possible reduces segregation; gates feeding the weighing batchers should have a quick and positive action; scales should be tested regularly; and the concrete mixer, if one is used, should be so placed that its contents can be readily observed. The yields of different mixes should be ascertained, and Mr. Clair quoted a table to illustrate this point. His experience has been that lean mixes tend to overrun, and rich mixes to underrun in yield, and the use of special aggregates also requires that accurate checks be made. He recommended routine concrete tests of 6 cylinders for each 1,000 cu.yd. of concrete produced to determine the strength results for various periods for different aggregates, cements, mixes, trucks, etc., and the employment of a competent concrete-designing engineer.

Mr. Clair warned against the use of cements of unknown quality or of some high-early strength cements which show a retrogression in strength after a certain period. He advised careful testing of all admixtures and coloring materials to make sure that they do not injure the concrete. The employment of a careful, practical concrete man as plant operator is of prime importance and check tests by independent outsiders are advised. In Mr. Clair's opinion a concrete-control engineer is necessary in every plant having a daily capacity of over 500 cu.yd., and in an average plant of this size accurate tests and controls can be made at a cost of about 10c per cu.yd.

In the discussion which followed, J. E. Burke (Ready Mixed Concrete Co., Pittsburgh, Pa.) and A. C. Avril (Avril Tru-Batch Concrete, Inc., Cincinnati, O.) gave some of their own experiences, the former with mixed aggregates, and the latter with separately-sized aggregates recombined at the batcher. Alexander Foster, Jr. (Warner Co., Philadelphia, Pa.) suggested separating the large sizes from the smaller graded sizes of aggregates to prevent segregation. He described a method which is used by his company and in which the concrete is mixed for a short period at the plant and then agitated on the way to the job. This method, he said, gave as good a concrete as a longer mix at the plant and resulted in greater plant capacity. Mr. Clair said it was his experience that a 30-sec. mix and a 15-min. agitation on the way to the job gave satisfactory results. A. T. Goldbeck, director of engineering, National Crushed Stone Assn., described the use of many chutes leading to various parts of a bin as means of preventing segregation. A spirited discussion between various concrete producers and cement-company representatives then brought

out the fact that most standard high-early-strength cements show no retrogression and that, in many instances where retrogression was found, it was due to the inferior quality of the aggregates used. H. F. Thomson stated that his company had made, over a period of three years, many tests of high-early-strength cement and concrete and that these showed no retrogression. Mr. Goldbeck then said that disintegration of concrete was most often due to voids caused by the use of excess mixing water.

The luncheon following this session was well attended. J. E. Burke, president of the association, made a brief address and introduced J. L. Shiely, treasurer, who outlined the progress of the association and the work still ahead of it. He asked the members to support their organization in every possible way, occasionally illustrating the points of his argument with suitable anecdotes.

H. F. THOMSON presided at the Monday afternoon session. He introduced R. B. Young, consulting engineer, Toronto, Ont., who spoke on *Purchase Specifications for Ready-Mixed Concrete*. Mr. Young opened his talk with the statement that the restriction by many municipalities to 1 hr. as the length of time allowable between the mixing and delivery of concrete was too severe. A 1½-hr. limit would make possible longer hauls and give the producer more leeway in case of unpreventable delays in transit without affecting the quality of the concrete delivered. He mentioned the fact that heating concrete beyond a certain point in cold weather, far from being an advantage, is, in fact, actually harmful.

Mr. Young asserted the right of the buyer of concrete to test any of the ingredients or the concrete at any time, and said that he has a right to expect concrete to meet all specifications at the time of delivery. For this reason he thinks it advisable to make tests at that time. As strength-test results are not known until from one week to one month after the concrete is poured he advised the use of some method of ascertaining the contents of a mix at the job.

In his opinion the science of testing concrete is still very inexact and tests generally give less than the true value of the concrete poured. The large allowances necessary for safety are expensive to both producer and buyer and can be reduced only by the development of better testing methods. He requested that producers submit data on tolerances and other related matters so that the committee can work up some accurate figures on this subject. In closing, he asserted that the concrete producer should have the right to take hardened cores in place to prove that he has met the buyer's requirements if any question should arise.

Mr. Thomson briefly commented on Mr. Young's address and introduced Ernest A. Hagy, consulting engineer of Cincinnati, whose address was added to the program because of the interest shown at the previous meeting. Mr. Hagy elaborated on Mr. Young's idea that laboratory-cured cylinders are not always typical of job conditions and said that too much stress is being placed on the results

of laboratory tests. He also discussed specifications for concrete used for structural frames and cited the specifications used in Cincinnati. After briefly commenting on the grading of aggregates, testing methods, strength specifications, time of mix, etc., Mr. Hagy entered upon the main theme of his address, that the contractor should be put on the same basis as the ready-mixed-concrete producer. He maintained that the architect, who is the final authority in most cases, should insist that the contractor have the same facilities for producing a high-grade job-mixed product under accurate control as the plant operator is required to have, in order to put them on a fair and even footing. It is important, said Mr. Hagy, that plant and truck facilities be adequate to deliver concrete at the rate required.

In the ensuing discussion of tentative specifications, H. F. Thomson and J. L. Shiely stated that any specification must be flexible enough so that it can be adapted to some extent to meet varying local conditions. C. W. Hutchinson, Richmond, Va., said that the ready-mixed-concrete industry should not attempt to restrict the ingredients of concrete but should define them only in terms of water, cement, and fine and coarse aggregates, as developments may at any time bring out new and satisfactory ingredients. At H. F. Thomson's request Mr. Clair commented briefly on the tentative specifications of the American Concrete Institute's committee, of which he is chairman, and action on them will be taken soon. Mr. Young commented on the tentative specifications on which he is working and which will be considered at the next meeting of the A.S.T.M. committee, of which he is a member. These two specifications have a marked similarity and, if agreed upon in their present forms, should result for the first time in a standard specification which can be universally applied and which will eliminate or simplify some of the many problems now confronting the concrete industry.

A. T. Goldbeck, director of the Bureau of Engineering, National Crushed Stone Assn., Washington, D. C., spoke on *Standard Methods of Testing Concrete*. Mr. Goldbeck, who is acknowledged as an authority on concrete research, described the various methods now in use for testing concrete. He cited the methods used in his own laboratory and stressed the necessity of adhering strictly to the standard methods if accurate results were to be expected. This subject is one with which every producer of concrete should be thoroughly familiar, as it is one of the fundamentals of this industry. Mr. Goldbeck covered every angle of the subject in detail. In speaking of tests made in his laboratory, he mentioned a workability test on which work is now progressing.

This address aroused considerable discussion and Mr. Goldbeck was called upon to answer many questions on test methods. In the course of this discussion Cloyd M. Chapman mentioned the work being done by the A. S. T. M. in educating laboratories to use standard test methods. This subject came up as a result of some comment on the discrepancies found in test results obtained by com-

mercial laboratories working on the same products.

In his own report Executive Secretary Ahearn referred to the recent organization of the association and to the three directors' meetings held during 1931. He asserted that the chief aim of the association is to promote the use of ready-mixed concrete but that most efforts are now being devoted to securing new members, as a representative membership is necessary in order that the association's work may be effective and valuable. As part of the work done along this line, he mentioned the compilation of a list of operators in the industry in order to facilitate the membership campaign. He also suggested applying to the U. S. Department of Commerce for securing service in the publication of data on the conditions and production in the industry.

Stanton Walker, director of engineering, announced that copies of his report would be distributed but that time permitted only a brief review of it. The preparation and distribution of information, said Mr. Walker, has been one of the chief functions of the association during its brief existence. A large share of the time has been spent in organizing activities on a business-like basis and in studying the problems of the industry in order to determine the work most necessary to be done. Some of the subjects to be worked on during the coming year are strength, design of proportions, methods of sampling, length of haul, time of mixing, estimating quantities, studies of equipment, and other practical problems. Some problems which may also be included are the effect of long mixing on grinding of aggregates; the effect of admixtures; the effect of using different brands of cements; the effects of the various steps in the handling of ready-mixed concrete on its durability, volume changes, and workability; the effect of heat resulting from mixing; the segregation of concrete; and many other problems. In conclusion he again asked for coöperation from the members.

THE morning session on Tuesday, Jan. 26, was devoted to a series of informal discussions on various subjects of interest, each led by an operator whose experience fitted him to conduct such a discussion. The session was presided over by R. B. Young, who asked H. F. Thomson to discuss *The Menace of the Irresponsible Operator*.

Mr. Thomson said that the ready-mixed-concrete industry is troubled by price wars, overbuilding, and irresponsible operators, all of which are against the best interests of the industry, and said that the association should join in the fight against them. He was careful to define that the term irresponsible operator meant an operator who had no knowledge of concrete, its control or design, and who turned out an inferior and undependable concrete, usually at cut prices. This classification, according to Mr. Thomson, includes both large and small plant operators of both central-mixing and truck-mixing types. Promiscuous distribution of equipment to such operators by equipment manufacturers in order to get established in certain territories or cities was also largely to blame for this condition.

Mr. Thomson further stated that ready-mixed concrete should be regarded as a prepared building material and that the industry should concentrate on its sale as high-grade, quality-controlled merchandise. This is still a pioneer product, he asserted, and the user must be educated to its advantages.

In the discussion which followed, Alexander Foster, Jr., cited an instance in which an equipment manufacturer would not sell to a plant opening in an already overcrowded territory. Edward Gogolie (Scranton Ready-Mixed Concrete Co., Scranton, Pa.), operating a medium-sized plant, spoke for the dependable smaller plant operators, saying that, while they do not have the capacity or testing facilities of the larger companies, they are in closer contact with the users and turn out the best concrete in their vicinity.

J. E. Burke further defined the irresponsible operator as neither a truck-mixing or a central-mixing-plant operator, but said that he might be either. The animated discussion which followed clearly demonstrated that the association is composed of both central-mixing and truck-mixing-plant operators, and that both types are well represented in the list of officers and in the executive committee. It was again brought out that the association's primary purpose is to promote the use of concrete made in central-mixing or truck-mixing plants.

Because of the amount of discussion created by the first paper it was decided to change the program somewhat so that other papers of interest to those present might be read first. The next subject was *Sales Methods*, and the discussion was led by Herbert J. Knopel (Warner Co., Philadelphia, Pa.) Mr. Knopel briefly reviewed the paper prepared by Alexander Foster, Jr., on this subject. He first discussed the price factors entering into the manufacture of ready-mixed concrete and stated that these, as well as the factors entering into the manufacture of job-mixed concrete, must be considered in establishing a fair selling price. He also reviewed the advantages of ready-mixed concrete, such as smaller pay-roll; better quality control; better control of ingredients; lower placing cost; certified strength, etc.

According to Mr. Knopel prices should be based on the cost of the ingredients of the concrete delivered wet or dry at the job. The price a contractor expects to pay for ready-mixed concrete is based on these and other factors entering into the manufacture of the concrete.

In order to justify its use, ready-mixed concrete should be able to meet this price and leave a fair profit for the plant operator. He also quoted statements made by users to the effect that the hydration of the concrete *en route* to the job simplified the removal of the forms after the concrete was set. Another feature of the industry, according to Mr. Knopel, is the fact that in a good year, when a plant is kept operating at near capacity, the savings in overhead can be passed on to the user of concrete as an additional saving.

THE Tuesday afternoon session was opened with a paper by J. L. Shiely on *Relations with Dealer and Manufacturer*. He gave a resumé of the troubles encountered in purchasing cement through dealers and paying them a profit. He said that purchasing direct from cement manufacturers was resisted by the dealers who had lost many customers through the growth of the ready-mixed-concrete industry. He also urged that the association join in efforts being made to arrange direct sales agreements with the cement manufacturers.

This discussion of the dealer element brought out opinions that the concrete producer should be treated as a dealer by the cement producers because of the large quantities used and because any discrimination would give the dealer who is also in the ready-mixed-concrete business an unfair price advantage. The general opinion, however, was that this question was beyond the scope of the association and that local conditions should be allowed to govern.

A. C. Avril (Avril Tru-Batch Concrete, Inc., Cincinnati, O.) next addressed the gathering on *Plant Operations*. In a brief review of this subject he stated that the use of belt-conveyors for handling aggregates and the bulk handling of cement were most economical and satisfactory if the conditions allowed their use. An ideal operation, he said, will store at least four separate sizes of aggregates in stock-piles with a tunnel conveyor recovery system feeding to four batcher-bins on the top of the concrete plant. The sizes desired are then recombined in the aggregate-weighing batcher, which, he said, should be a single unit with a 4-beam scale. The use of stock-pile storage also helps to maintain a constant moisture content, because it allows the aggregates to drain. Stock-piles and concrete storage bins, in his experience, also help to maintain a constant temperature for cold-weather operation. Various methods of heating water and aggregates were then discussed and the general opinion seemed to be that the use of live steam was more satisfactory than the use of steam coils, because there was less tendency to dry the surface of the aggregates.

The next paper, *Haulage Methods*, was presented by Paul P. Bird (Boston Concrete Corp., Boston, Mass.). He credited the rapid growth of the industry largely to the development and perfection of truck-mixers and agitators and said that they are still the most important units in the operation of a plant. He mentioned a series of tests which had been made by his company in coöperation with Miles N. Clair of the Thompson & Lichtner Co. on the effects of mixing time on the characteristics of concrete. It was found, said Mr. Bird, that the mixing time up to 2-hr. had little effect on the

strength of the concrete, but that, after an hour of mixing, the plasticity began to decrease. Haulage costs, on a total of 110,000 cu.yd. of concrete delivered in three different types of bodies, were found to average about 21 c. per cu.yd.-mile. Mr. Bird then briefly described a method used by his company for hauling cement from a railroad siding some distance away to the plant. This system was completely described and illustrated on page 68 of the Dec. 30, 1931, issue of PIT AND QUARRY. Arthur A. Levison (Blaw-Knox Co.) then briefly reviewed the development of agitator and mixer bodies from the early days of the industry to the present time and gave a few precautions to be taken to get the best results from their use.

The next subject to be discussed was *Contacts with Engineers and Architects*. As J. C. Eakin, to whom this subject had been assigned, was not present, a general discussion was held. It was brought out again that ready-mixed concrete must prove itself to be a superior product in order to gain increased favor. It was suggested that the association do what it can to educate engineers and architects in the advantages of ready-mixed concrete.

R. B. Young, who presided at this meeting, then closed the discussion in order that those present might have an opportunity to visit the local plants. The paper on *Servicing the Job*, which was to have been read by J. E. Burke, was also left out of the program but it was announced that copies of all papers presented at the convention would be sent to each of the members. President Burke then again briefly discussed the program of the association for the coming year and closed the convention with an expression of appreciation for the attendance and the great interest shown in all the subjects on the program.

Entertainment was naturally limited because of the short duration of the convention. The annual banquet was held at 7:00 p.m. on Jan. 25, and was attended by a large number of concrete producers, equipment manufacturers, and guests. An orchestra provided dinner-dance music for those so inclined. After the repast, entertainment was provided in the form of dancing and singing acts by a cast of talented performers.

Because of the fact that this convention immediately preceded that of the National Sand & Gravel Assn., the manufacturers' exhibit was held in conjunction with the latter. In fact, most of these manufacturers kept the same booths and exhibits through both these two conventions and the crushed-stone convention, which was held during the preceding week. The convenience this arrangement afforded to both exhibitors and visitors received much favorable comment.

REGISTRATION

Abbott (H. B.), Lehigh Portland Cement Co., Buffalo, N. Y.
Adamson (C. H.), Stephens-Adamson Mfg. Co., Chicago, Ill.
Ahearn (V. P.), National Ready-Mixed Concrete Assn., Washington, D. C.
Andrus (B. S.), Certified Concrete Co., St. Paul, Minn.
Ashcraft (Charles E.), Sauerman Bros., Inc., Chicago, Ill.
Avril (Arthur C.), Avril Tru-Batch Concrete, Inc., Cincinnati, O.

Bair (Homer F.), St. Clair Supply Co., Greensburg, Pa.
Barber (Forest O.), Simplicity Engineering Co., Durand, Mich.
Barron (W. E.), H. K. Porter Co., Pittsburgh, Pa.
Battjes (Henry R.), Grand Rapids Gravel Co., Grand Rapids, Mich.
Beglinger (R. T.), Allis-Chalmers Mfg. Co., Pittsburgh, Pa.
Berger (J. Pennell), John A. Roebling's Sons Co., Trenton, N. J.

Bernard (J. L.), Bernard Ready Mixed Concrete Co., Washington, D. C.
Berninger (W.), A. Leschen & Sons Rope Co., St. Louis, Mo.
Bird (Paul P.), Boston Sand & Gravel Co., Boston, Mass.
Bishop (John M.), Good Roads Mch. Co., Pittsburgh, Pa.
Bliss (W. A.), Ready-Mixed Concrete Co., Pittsburgh, Pa.
Board (B. C.), Ohio River Sand & Gravel Co., Wheeling, W. Va.

- Bonavita (Roy H.), Maloney Paving Co., Washington, D. C.
- Boyd (J. E.), National Crushed Stone Assn., Washington, D. C.
- Boyd (J. R. Mrs.), Washington, D. C.
- Buck (Edward M.), PIT AND QUARRY, New York, N. Y.
- Buckbee (J. C.), Northern Gravel Co., West Bend, Wis.
- Burke (J. E.), Ready-Mixed Concrete Co., Pittsburgh, Pa.
- Buschman (W. A.), PIT AND QUARRY, Chicago, Ill.
- Butterworth (A. C.), General Material Co., St. Louis, Mo.
- Caldwell (Arthur), Scranton Ready-Mixed Concrete Co., Scranton, Pa.
- Caldwell (H. P.), Ohio River Sand Co., Louisville, Ky.
- Chapman (Cloyd M.), Consulting Engineer, New York, N. Y.
- Chapman (H. N.), Charles H. Fry Construction Co., Erie, Pa.
- Clair (Miles N.), Thompson & Lichtner Co., Boston, Mass.
- Clark (W. E.), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
- Clouse (H. D.), Lincoln Sand & Gravel Co., Lincoln, Ill.
- Coates (W. E.), PIT AND QUARRY, Cleveland, O.
- Coffman (Herbert), Hercules Cement Corp., Philadelphia, Pa.
- Connar (V. N.), Universal Atlas Cement Co., Pittsburgh, Pa.
- Conrades (Ott S.), St. Louis Material & Supply Co., St. Louis, Mo.
- Crangle (W. H.), Metropolitan Concrete Co., Cleveland, O.
- Dandridge (E. P.), Stephens-Adamson Mfg. Co., Pittsburgh, Pa.
- Dankel (O. M. E.), Loizeaux Builders' Supply Co., Elizabeth, N. J.
- Darlington (E. S.), General Electric Co., Pittsburgh, Pa.
- Davison (George McC.), J. K. Davison & Bro., Pittsburgh, Pa.
- Davison (H. S.), Ready-Mixed Concrete Co., Pittsburgh, Pa.
- Dibert (F. A.), East Side Coal Supply Co., Inc., Altoona, Pa.
- Dibert (J. O.), East Side Coal Supply Co., Inc., Altoona, Pa.
- Dorman (Charles E.), Patterson Supply Co., Monongahela, Pa.
- Du Puis (O. G.), Eagle Iron Wks., Des Moines, Ia.
- Durant (G. J.), Froehling & Robertson, Inc., Richmond, Va.
- Ellis (George C.), Transit Mixers, Inc., Dunellen, N. J.
- Eyman (O. E.), Charleroi Supply Co., Charleroi, Pa.
- Farmer (Homer G.), Universal Atlas Cement Co., Pittsburgh, Pa.
- Farrell (Samuel), Rollway Bearing Co., Pittsburgh, Pa.
- Fisher (Ben J.), John A. Roebling's Sons Co., New York, N. Y.
- Fitzgerald (Leonard), Hummel-Ross Fiber Corp., Hopewell, Va.
- Fletcher (R. C.), Flint Crushed Gravel Co., Des Moines, Ia.
- Fonde (Chas. H.), Cherokee Concrete Co., Knoxville, Tenn.
- Foringer (W. E.), J. A. Roebling's Sons Co., Trenton, N. J.
- Foster, Jr. (Alexander), Warner Co., Philadelphia, Pa.
- Fraas (Henry C.), Jaeger Machinery Co., Columbus, O.
- Franjiane (Peter P.), J. P. Callaghan, Inc., Newark, N. J.
- Frosch (A. E.), Eastern Ohio Sand & Supply Co., East Liverpool, O.
- Fuller (H. B.), Blaw-Knox Co., Blaw-Knox, Pa.
- Garber (M. B.), Thew Shovel Co., Lorain, O.
- Gass (K. W.), Stephens-Adamson Mfg. Co., Pittsburgh, Pa.
- Gill (W. C.), Lake Erie Mining Co., Peoria, Ill.
- Gogolie (Edward), Scranton Ready-Mixed Concrete Co., Scranton, Pa.
- Goldbeck (A. T.), National Crushed Stone Assn., Washington, D. C.
- Goldbeck (Mrs. A. T.), Washington, D. C.
- Goldberg (Abe), Allis-Chalmers Mfg. Co., Milwaukee, Wis.
- Gross (L. H.), York Concrete Co., York, Pa.
- Guilfoil (D. D.), Sauerman Bros., Inc., Chicago, Ill.
- Hacker (J. F.), Chain Belt Co., Milwaukee, Wis.
- Hammond (E. M.), Gravel Products Corp., Buffalo, N. Y.
- Harsh (E. C.), Rock Products, Chicago, Ill.
- Hefft (Jos. S.), Robins Conveying Belt Co., Pittsburgh, Pa.
- Hohman (A. E.), Blaw-Knox Co., Blaw-Knox, Pa.
- Howard (Walter E.), Superior Ready-Mixed Concrete Co., Cincinnati, O.
- Howe (Myron A.), Whittemore Co., Roslindale, Mass.
- Hutchinson (C. W.), Richmond, Va.
- Hagy (Ernest A.), Consulting Engineer, Cincinnati, O.
- Huntington (C. S.), Link-Belt Co., Chicago, Ill.
- Jackson (R. U.), Robins Conveying Belt Co., Pittsburgh, Pa.
- Johnson (R. C.), Simplicity Engineering Co., Durand, Mich.
- Johnston (V. D.), Lincoln Sand & Gravel Co., Lincoln, Ill.
- Jones (H. B.), National Equipment Corp., Milwaukee, Wis.
- Jones (Rowland), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
- Kirkendall (F. B.), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
- Knight (Theodore C.), Kelley Electrical Machinery Co., Buffalo, N. Y.
- Knopel (Herbert J.), Warner Co., Philadelphia, Pa.
- Koehring (Robert C.), National Equipment Corp., Milwaukee, Wis.
- Kuhlman (E. H.), Kuhlman Builders' Supply & Brick Co., Pittsburgh, Pa.
- Kurtz (Harold R.), John A. Roebling's Sons Co., Trenton, N. J.
- Laird (C. B.), Eagle Iron Wks., Des Moines, Ia.
- Lanz (Thomas C.), George Lanz & Sons, Inc., Pittsburgh, Pa.
- Leigh (A. C.), Dravo Contracting Co., Pittsburgh, Pa.
- Levison (Arthur A.), Blaw-Knox Co., Blaw-Knox, Pa.
- Lewis (Charles), Hamilton Builders' Supply, Ltd., Hamilton, Can.
- Lick (Karl W.), General Material Co., St. Louis, Mo.
- Locke (B. C.), Lake Erie Mining Co., Peoria, Ill.
- Manchester (W. D.), Lynn Sand & Stone Co., Swampscott, Mass.
- Maxwell (C. W.), Ready-Mixed Supply Corp., Albany, N. Y.
- McCready, Jr. (James H.), McCready-Rodgers Co., Pittsburgh, Pa.
- McElwee, Jr. (James F.), McElwee & Rogy, Inc., Peoria, Ill.
- McKinn (Pearl O.), National Ready-Mixed Concrete Assn., Washington, D. C.
- McLean (R.), Transit Mixers, Inc., Dunellen, N. J.
- McLaughlin (L. J.), Hug Co., Cleveland, O.
- McMillin (E. R.), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
- McNally (T. H. R.), Toronto, Can.
- McSorley (R. S.), Whittemore Co., Boston, Mass.
- Merrill (W. S.), McCready Construction Co., Pittsburgh, Pa.
- Meyer (Adam F.), Adam F. Meyer C. B. & S. Co., Cincinnati, O.
- Miller (A. E.), Chain Belt Co., Milwaukee, Wis.
- Miller (F. J.), Ready-Mixed Concrete Co., Covington, Ky.
- Moyer (R. F.), Providence Transit Concrete Corp., Providence, R. I.
- Murtland (John), John Murtland, Inc., Atlantic City, N. J.
- Nece (W. R.), Bernard Ready-Mixed Concrete Co., Washington, D. C.
- Patterson (Frank O.), Patterson Supply Co., Monongahela, Pa.
- Patterson (Otis L.), Donora Construction Co., Donora, Pa.
- Perry (L. A.), Pioneer Sand & Gravel Co., Seattle, Wash.
- Phillips (Stanley A.), PIT AND QUARRY, Chicago, Ill.
- Phillips (Mrs. Stanley A.), Chicago, Ill.
- Potts (Robert J.), Potts-Moore Gravel Co., Waco, Tex.
- Pringle (W. D.), W. S. Tyler Co., Cleveland, O.
- Proudley (Chas. E.), National Sand & Gravel Assn., Washington, D. C.
- Raff (A. H.), Manheim Mfg. & Belting Co., Chicago, Ill.
- Randle (A. W.), PIT AND QUARRY, New York, N. Y.
- Rankin (J. K.), Hardy & Rankin Co., Canonsburg, Pa.
- Riblet (Harry G.), Ready-Mixed Concrete Co., Erie, Pa.
- Robertson (H. S.), Thew Shovel Co., Pittsburgh, Pa.
- Robinson (A. P.), Ransome Concrete Machinery Co., Dunellen, N. J.
- Rodgers (Phil K.), McCready-Rodgers Co., Pittsburgh, Pa.
- Rodgers (William), McCready-Rodgers Co., Pittsburgh, Pa.
- Roess (G. Frederick), Gus F. Roess Sons Co., Oil City, Pa.
- Rolfe (B. C.), Ready-Mixed Concrete Corp., Richmond, Va.
- Rosser (Robert), Wyoming Valley Ready-Mixed Concrete Co., Wilkes-Barre, Pa.
- Roush (J. H.), State Road Commission, Wheeling, W. Va.
- Russell (G. H.), Russell Bros., Washington, D. C.
- Schaper (P. Gus), Charles H. Fry Construction Co., Erie, Pa.
- Shugg (L. W.), General Electric Co., Pittsburgh, Pa.
- Seader (Miss M. L.), Allen Cone & Machinery Co., New York, N. Y.
- Settle (J. M.), Ohio River Sand Co., Louisville, Ky.
- Shiely (J. L.), J. L. Shiely Co., St. Paul, Minn.
- Shiely (Mrs. J. L.), St. Paul, Minn.
- Shotton (Bruce G.), Hendrick Mfg. Co., Carbondale, Pa.
- Skarin (Emil), Crown Paving & Construction Co., Ltd., Edmonton, Alberta, Can.
- Smith (A. V.), Hamilton Builders' Supply Co., Hamilton, Can.
- Smith (Donald H.), Schaffer Poidometer Co., Pittsburgh, Pa.
- Smith (Frank B.), Bucyrus-Erie Co., Pittsburgh, Pa.
- Smith (Stanley W.), Standard Portland Cement Co., Cleveland, O.
- Stanley (W. L.), George Lanz & Son, Inc., Pittsburgh, Pa.
- Spradling (R. D.), La Industrial Platense Decia y Cia., Buenos Aires, Argentine.
- Stauffer (P. F.), Fuller Co., Catasauqua, Pa.
- Stepanian (S.), Arrow Sand & Gravel Co., Columbus, O.
- Stewart (H. H.), J. K. Davison & Bro., Pittsburgh, Pa.
- Stolzenbach, Jr. (C. H.), Sand & Gravel Co. of Pittsburgh, Pittsburgh, Pa.
- Talbot (K. H.), National Equipment Corp., Milwaukee, Wis.
- Thom (L. G.), Ready-Mixed Concrete Corp., Richmond, Va.
- Thompson (K. I.), Fuller Co., Catasauqua, Pa.
- Thompson (Warren H.), Consulting Engineer, Cleveland, O.
- Thomson (H. F.), General Material Co., St. Louis, Mo.
- Timlin (M. A.), E. L. Conwell & Co., Philadelphia, Pa.
- Toepfer (George E.), Clinton Concrete Conveyors, Reading, Pa.
- Tompkins (E. S.), Allen Cone & Mch. Co., New York, N. Y.
- Trauffer (W. E.), PIT AND QUARRY, Chicago, Ill.
- Tullington (Richard), E. M. Tullington Sons, Clearfield, Pa.
- Tyler (R. P.), John A. Roebling's Sons Co., Trenton, N. J.
- Umstad (W. L.), Keystone Portland Cement Co., Philadelphia, Pa.
- Ungar (Frank B.), Ludlow-Saylor Wire Co., St. Louis, Mo.
- Vinogradoff (A. I.), A. G. McKee, Cleveland, O.
- Waite (Glenn W.), Koenig Coal & Supply Co., Detroit, Mich.
- Walker (Stanton), National Ready-Mixed Concrete Assn., Washington, D. C.
- Walker (Mrs. Stanton), Washington, D. C.
- Warner (J. J.), Cincinnati Builders' Supply Co., Cincinnati, O.
- Warren (Roy V.), Western Pennsylvania Sand & Gravel Producers' Assn., Pittsburgh, Pa.
- Welch (F. M.), F. M. Welch Engineering Service, Inc., Greenville, O.
- Whitman (B. W.), York Concrete Co., York, Pa.
- Williamson (George H.), J. K. Davison & Bro., Pittsburgh, Pa.
- Wing (J. K.), Detroit Transit-Mixed Concrete Co., Detroit, Mich.
- Winsor (Q. J.), Thew Shovel Co., Elyria, O.
- Wyse (F. O.), Bucyrus-Erie Co., South Milwaukee, Wis.
- Young (Charles H.), Landers, Morrison, Christenson Co., Minneapolis, Minn.
- Young (Mrs. Charles H.), Minneapolis, Minn.
- Young (R. B.), Ontario Ready-Mixed Concrete Co., Toronto, Can.
- Zimmelman (M.), Blaw-Knox Co., Blaw-Knox, Pa.

Production Methods and Costs of Dallas Washed & Screened Gravel Co.*

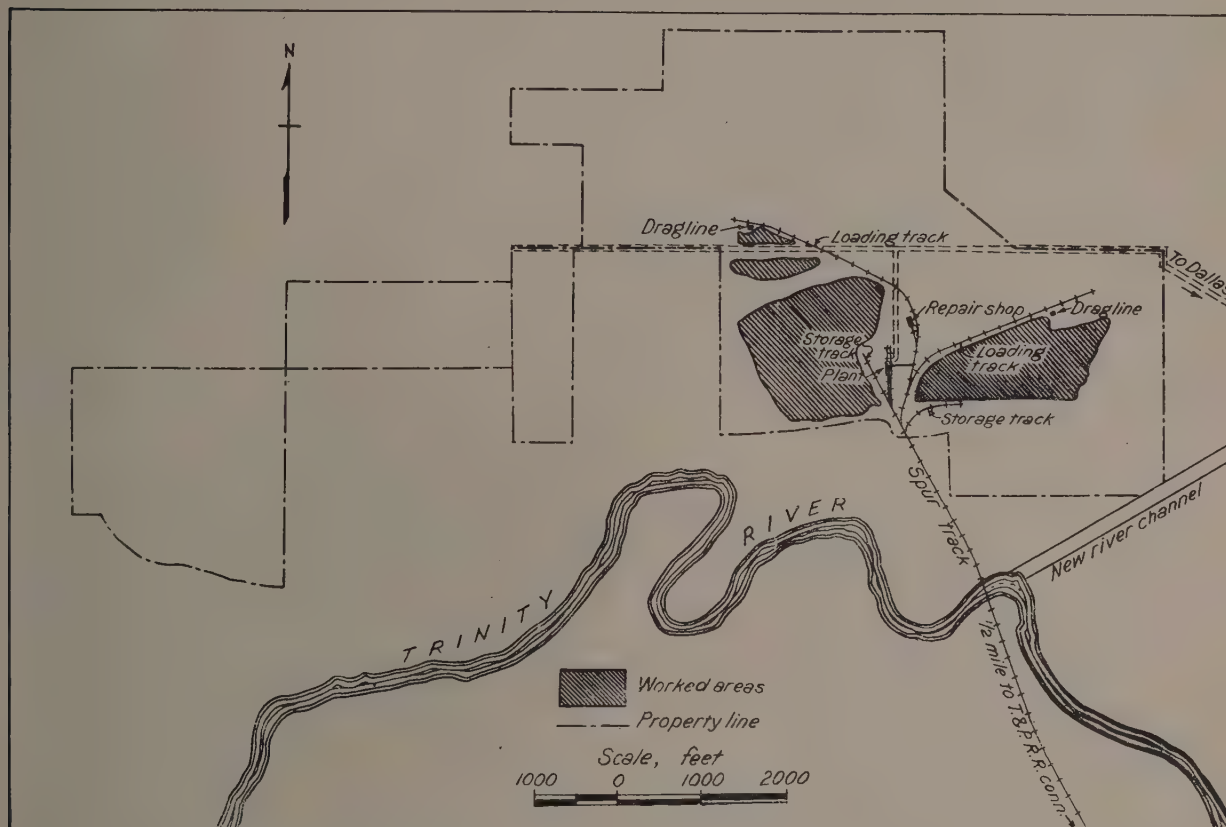


Fig. 1. Map of the Cloudy property, showing plant, river and trackage.

Mining and Processing Practice Employed at This Company's Cloudy, Tex., Operations

By RALPH L. WINDROW
General Manager

THE first gravel and sand deposits that were worked in the vicinity of Dallas were shallow pits from which road gravel, pit-run gravel, or sand were removed. The overburden was stripped from the deposit by hand, loading into wagons, or by team and slip scrapers. The sand or gravel was then loaded into wagons by men with shovels. Hill-side deposits and deposits above water level were the most economical to work and, as no material could be removed from below water level without the use of large pumps, the deposits that have since proved the most valuable could not have been worked economically at that time.

The first steam shovels for loading gravel from the pits near Dallas were used to load railroad ballast. The first of these was a Type A, No. 8 Marion of 1-cu. yd. capacity. In 1900 an Otis $\frac{3}{4}$ -cu. yd. steam shovel was moved into this territory, and the

first large unit was a Type AA, $21\frac{1}{2}$ -cu. yd. Marion steam shovel used in a ballast pit west of Dallas in 1901.

Prior to 1909 most of the concrete used in Dallas was made with crushed stone shipped into the city from other places and used with local sand. The wagon haul on gravel made it more expensive than stone. The first street in Dallas using a concrete base course made with pit-run gravel was built in the latter part of 1908.

In 1909 a steam shovel for loading gravel for concrete work was put into operation in one of the gravel pits near Dallas. This shovel, a Thew with a $\frac{5}{8}$ -cu. yd. dipper, loaded from 100 to 200 cu. yd. of overburden per day into wagons, thus speeding up the process of stripping. After the overburden was removed, the shovel loaded the gravel into wagons for delivery to customers. The main disadvantage of this method of loading was the necessity of using mats under the shovel when the excavation neared

* Reprinted from U. S. Bureau of Mines Information Circular 6581 and presented at the 1932 convention of the National Sand & Gravel Assn.

the water level. Expensive pumping was also necessary when gravel below normal water level was excavated.

In 1911 the first drag-line used in a gravel pit in the Dallas territory was put into operation. This machine was a 1-cu. yd. steam-driven, wood-frame Monighan with a 50-ft. boom and was such an improvement over the shovels in use that drag-lines soon replaced shovels for this type of work. Several years after the installation of the first drag-line, the first washing-and-screening plant was built in this territory.

The Cloudy deposit of the Dallas Washed & Screened Gravel Co. of Dallas was first opened in 1906 by H. T. Farrell, and a railroad connection with the Texas & Pacific Ry. was built into the deposit in 1917. The present washing-and-screening plant was not built, however, until the latter part of 1927. Prior to this the output was principally pit-run concrete gravel and road gravel. Little railroad ballast has been shipped from this deposit. The Cloudy property consists of about 900 acres of land on the north side of the Trinity River. Fig. 1 shows a general layout of the property.

Geology.—The gravel deposits at the Cloudy pit are similar in general type to a number of other deposits of gravel in the Trinity River valley. These deposits vary from fine sand to material containing 70 per cent. of gravel above $\frac{1}{4}$ in. and up to 3 in. in diameter. The deposits rest on a clay or shale stratum that lies almost horizontally and at a depth usually varying from 16 to 22 ft. below the surface. As is the case with several of the Trinity River deposits, the lower 4 to 8 ft. of the gravel at Cloudy are under water and from 4 to 9 ft. are above water. Overlying the gravel deposit is a blanket of red clay and black loam varying from 3 to 12 ft. in thickness. The average depth of overburden at Cloudy is 7 ft. and the average depth of gravel is 12 ft. Gravel deposits occur at various places in the river valley but are usually within 500 ft. of the present river channel. The Cloudy deposit is, however, about $1\frac{1}{2}$ mi. north of the present channel.

The Trinity River is now a silt-bearing stream and has not deposited any gravel in many years, as is shown by the heavy covering of silt over the gravel deposits and the silt deposits along the present channel.

Physical Characteristics.—Because the deposits have considerable overburden and the strata of

gravel are relatively thin they can be most economically excavated with drag-line machines. The presence of water in the lower parts of the deposits prevents the use of power shovels. The deposits are spread over an area large enough for the economical use of standard-gauge railroad equipment for transporting the pit-run material to the washing plant.

The sand is made up largely of silica, but it also contains a small percentage of limestone. The gravel is largely hard limestone and silica pebbles which have been brought down from the upper river valley. The sand is sharp and well sized; the gravel meets the standard specifications for hardness, strength and shape. The material in this deposit contains but little soft limestone and, to date, no trouble has been caused by clay or shale seams. Considerable hard limestone occurs about 100 mi. up the river from the Cloudy plant, but none of the limestone ledges in the immediate vicinity of Dallas are hard enough to be used in concrete. The average gravel ranges in size up to 3 in. However, in parts of the deposit there are enough stones larger than 3 in. to warrant the operation of a small crusher at the screening plant.

Most of the gravel at Cloudy is underlain by a laminated blue shale that is hard enough to allow the gravel to be removed with drag-line buckets without disturbing the shale, provided the operators use ordinary care in excavating.

Methods of Prospecting.—For preliminary prospecting on this property, holes 300 ft. apart were sunk in water level by using a 6-in. auger with an extension handle made of $\frac{3}{4}$ -in. pipe. Holes up to 20 ft. in depth can be sunk with these augers if water or very sandy material is not encountered. The cost of these holes is about 15 c. per ft. This type of testing was used only to determine the boundaries of the gravel deposit and the depth of the overburden.

After the gravel deposits were outlined by means of augers, test pits spaced 600 ft. apart were excavated to determine the thickness and quality of the gravel. Some of these pits were dug by hand and some were excavated with a 1-cu. yd. crawler-type gasoline drag-line crane. The crane would have been used to dig all the pits except for the fact that part of the property is about 2 mi. west of the plant and the time lost in moving the crane to this part of the deposit would have offset the additional expanse of digging the holes by hand. Test pits of this type cost about \$1 per ft. of depth when a machine was used and \$1.50 per ft. when dug by hand.

Attempts were made to determine the thickness of the gravel on part of the Cloudy property by using a 6-in. well casing and a 5-in. slush bucket to sink through the gravel under water. This method was not satisfactory where the material contained an appreciable amount of gravel larger than $1\frac{1}{2}$ inches, because of slow progress in sinking.

After the areas and thicknesses of the gravel were determined, the volume of gravel was calculated and converted into tonnage by assuming a

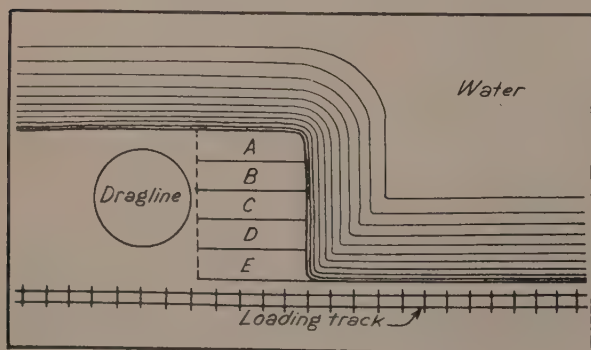


Fig. 2. Plan showing method of excavating in sections.

weight of 3,000 lb. per cu. yd. Screen analyses of the material from various test holes were then made and the average percentage of sand and gravel that should be recovered from the property was estimated.

Two methods were used to obtain samples for screen analysis. When test holes were dug with the drag-line, the overburden was cast on one side of the hole and the gravel on the opposite side; then an average sample was selected and shoveled into a sack. When test holes were dug by hand, samples were obtained above the water line by removing two shovelfuls of material from the side of the test hole. These samples were taken at regular depth intervals of 3 ft. and all samples from a hole were mixed to obtain the average of the material above the water line. Samples from below the water line were removed from the center of the holes at the same depth intervals. The information obtained from these tests has been valuable in coordinating mining with market requirements due to the variance in both the quality and size of material in the deposits and the size and grading of material required by customers.

Tests on all of the Trinity River gravel deposits have shown that the thickness of the strata, size and quality of material, and even the color of the gravel and sand change within short distances. The deposits are irregular in shape and change from gravel to sand, clay, or loam, in some instances in a distance of 10 ft. or less.

Choice of Method.—The considerable tonnage of gravel included in the Clowdy deposit, its location with respect to the market, and the increased demand for washed and graded aggregates warranted the installation of a washing plant. This plant was installed, using Link Belt equipment, and was so designed that either cars or trucks could be loaded directly from the plant bins. During 1930 about one-third of the material sold was moved by trucks to Dallas or to construction work in Dallas County.

The level ground, the large area of the deposits, and the fact that all pit-run gravel and road gravel for retail shipment could be loaded directly into cars made standard-gage rail transportation from dragline to washing plant the most economical method of handling the material. Fig. 1 shows the track to the Texas & Pacific Rwy. and the tracks around the plant and to the draglines.

The excavated areas at Clowdy have practically no value and, as there is no sale for the overburden, the economical method of handling it has been to cast it into the excavated pits. This leaves an uneven surface on the worked-over land with high points above the original ground level and the low points some 2 or 3 ft. above the shale. These excavated areas are subject to overflow during periods of high water and the lower parts of the area are always under water, making the land worthless except for use as water storage.

About once a year overflows varying from 1 to 4 ft. above the average elevation of the Clowdy property cause some damage and delay by washing out tracks and depositing mud and driftwood on the tracks and the roads around the plant. The

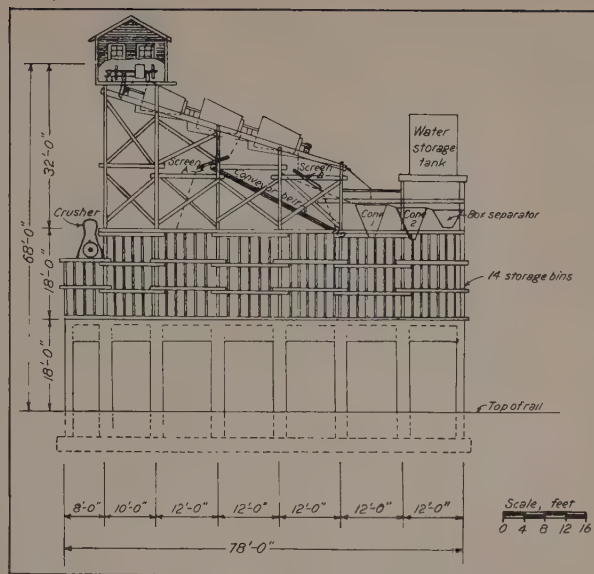


Fig. 3. West elevation of the plant.

delay to operations varies from one to seven days. Two dams being built on the Trinity River northwest of Fort Worth and a dam being built on Mountain Creek about 4 mi. south of the Clowdy plant will materially reduce the overflow hazard after 1931.

Mining Methods.—The overburden is removed from the gravel by the use of drag-line machines. During the latter part of 1930 two drag-lines were in use. One of these machines is a 2-cu. yd. Monigahan drag-line with a 60-ft. boom and the other is a 3-cu. yd. Bucyrus with a 70-ft. boom. The Monigahan machine is driven by a 75-hp. Fairbanks-Morse Diesel engine and the Bucyrus machine is driven by a 100-hp. Diesel engine of the same make. These machines are operated so as to allow one to load gravel into cars while the other removes overburden. At the close of 1930, the machines were located as shown in Fig. 1. The capacity of the two machines exceeds requirements sufficiently to allow time for making minor repairs when necessary. The overburden can be handled at the rate of about 75 cu. yd. per hr. for each cubic yard of capacity of the drag-lines. The fact that each machine removes overburden and excavates gravel in alternating sequence makes the stripping operation interlock with the mining of the gravel.

After the overburden is removed by the drag-line, the gravel is loaded into 16-cu. yd. Western automatic-dump cars for transportation to the washing plant. Drag-line operators are instructed to load a part of each car with gravel from below the water line and a part from above the water. In order to do this a cut is excavated in sections as shown in Fig. 2. First, all of the material in section A above the water line is loaded, then the material below water in section A is excavated together with the material above the water line in section B. This procedure is carried out in mining all the material in the cut and makes it possible to load dry and wet material together, except when

The average daily tonnage mined during 1930 was 1,030 tons, and the total tonnage was 375,700 tons. The material was divided as follows: Washed gravel, 188,000 tons; Washed sand, 151,000 tons; Pit-run gravel, 31,000 tons; Road gravel, 5,700 tons.

During the first eight months of 1930 a 2-cu. yd. Monighan Diesel-engine drag-line and a 2½-cu. yd. steam drag-line were used to excavate the overburden and gravel at the Clowdy plant. In September the steam machine was replaced by a 3-cu. yd. Diesel-engine Bucyrus drag-line. All these machines are full revolving but all differ as regards traveling mechanism. The steam machine is a skid-and-roller type which moves on 8-in. wooden rollers on 3-in. by 10-in. plank runways. The machine is moved by placing the bucket in digging position and using it as a deadman, and then pulling the machine forward with the drag cable. This type of traveling equipment is unsatisfactory because it is slow at all times, hard to operate over wet or soft ground, and expensive because about six laborers are required to move the rollers and runways when the machine is moved any considerable distance. The 2-cu. yd. Diesel Monighan is a walking-type machine. This type of traveling mecha-

A drag-line crew consists of one operator and one oiler on each shift. The machines are operated almost continuously during the busy season with shutdowns only when necessary for repairs. During the winter months only one machine is used.

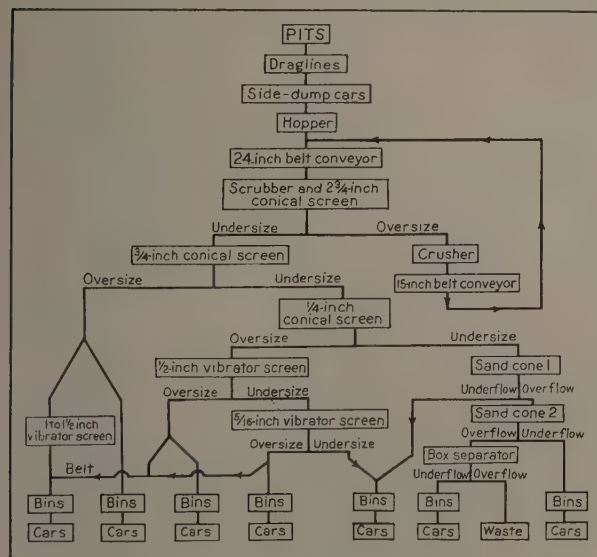
Two locomotives haul all material from the draglines to the plant and from the plant to the main line of the railroad. One of these is a 60-ton American locomotive bought from the Santa Fe Railroad and the other is a 60-ton Baldwin, bought new. They are oil burning, have six drivers, and a drawbar pull of about 22,000 lb. The work performed by these locomotives includes the switching of cars at the plant and the handling of cars that are to be unloaded into storage.

Fig. 1 shows the loading tracks, plant tracks, and the main-line connection with the Texas & Pacific



Fig. 4. North elevation of the Clowdy plant.

gyratory crusher, the discharge of which is returned to the main conveyor by a 15-inch belt as shown in Fig. 4. This 15-in. conveyor is 61 ft. between centers and is motor driven at a speed of 175 ft. per min.



The undersize is carried over a conical rotating screen having $\frac{3}{4}$ -inch openings. The oversize on this screen is carried either directly into storage bins below for sale as $2\frac{1}{2}$ -in. gravel or is passed over a 4 ft. by 7 ft. Link-Belt vibrator screen on a 30 deg. incline (screen A, Fig. 3) where material above 1-in., $1\frac{1}{4}$ -in., or $1\frac{1}{2}$ -in. size can be removed as required. The undersize from the $\frac{3}{4}$ -in. screen is carried to a conical screen having $\frac{1}{4}$ -in. openings. All three conical screens are on one shaft and are driven by a motor at the top of the plant. They are 72 in. in diameter at the top, 36 in. in diameter at the small end, 96 in. long, and make 10 r.p.m. The oversize on the $\frac{1}{4}$ -in. screen is carried to a $\frac{1}{2}$ -in.-mesh vibrator screen (screen B, Fig. 3) the undersize from which is carried to a secondary vibrating screen with $\frac{5}{16}$ -in. openings. The $\frac{1}{2}$ - and $\frac{5}{16}$ -in. screens are mounted on a 30 deg. slope on a 4 ft. by 7 ft. Diester single-deck vibrator that has been converted into a double-deck vibrator. The oversize on the $\frac{1}{2}$ -in. screen is chuted into a bin for sale as $\frac{3}{4}$ -in. gravel or is conveyed by the belt shown in Fig. 3 to be mixed with gravel from the larger-sized screens. This conveyor belt is 24 in. wide, 27 ft. between centers, and travels 147 ft. per min. The oversize on the $\frac{5}{16}$ -in. screen is carried into bins for sale as $\frac{1}{2}$ -in. gravel, to the sand bins when coarse sand is required, or is conveyed by the short 24-in. belt (Fig. 4) to be mixed with the larger sized gravel. The undersize through the $\frac{5}{16}$ -in. screen is chuted into the coarse-sand bin in such a way as to mix with sand discharged from sand cone No. 1. The undersize through the $\frac{1}{4}$ -in. conical screen is sent to two 72-in. Link-Belt sand cone separators, then to a box separator where the sand is removed and the water and silt are allowed to overflow into the excavated areas. A complete flow sheet of the plant is shown in Fig. 5.

Based on the output of the plant, the equipment handles about the following percentages of the material:

<i>Machine</i>	<i>Per Cent.</i>
Belt loader	100
Main conveyor belt	100
Scrubber and 2¾-in. screen	100
Crusher and crusher conveyor	3
¾-in. screen	100
¼-in. screen	70
0 to 1½-in. vibrator	7
½-in. vibrator	25
5/16-in. vibrator	15
3 sand separators	45

The life of the various screens in terms of tonnage handled by each is about as follows:

<i>Size of screen opening</i>	<i>Material</i>	<i>Life</i>
2¾ in.	¼-in. punched plate.....	300,000 tons
¾ in.	¼-in. punched plate.....	200,000 tons
¼ in.	⅜-in. punched plate.....	75,000 tons
1½ in.	¼-in. punched plate.....	100,000 tons
½ in.	Woven wire	15,000 tons
⅝ in.	Woven wire	10,000 tons

February 10, 1932

encountered in the deposit. The maximum production of washed and screened sand and gravel for a 24-hr. period during 1930 was 60 cars or about 3,000 tons.

The power used in operating the plant is furnished by the Texas Power & Light Co., through a 3-mi. line from a trunk transmission line north of the plant. Three-phase, 11,000-volt current is stepped down to 440 volts by a transformer bank located at the plant. The plant operation requires an average demand load of 90 hp. to operate the following motors:

A 50-hp. direct-connected motor driving the conical screens and the main conveyor belt.

A 35-hp. direct-connected motor driving an 8-inch centrifugal pump that furnishes the wash water.

A 15-hp. motor driving the crusher.

A 5-hp. motor driving the vibrator screens.

A 5-hp. motor driving the crusher conveyor.

A 3-hp. motor driving the small plant conveyor.

Washed sand and gravel for which there is no immediate sale is stored for a few days in cars and then unloaded into storage. The material is handled into and out of storage by a 1-cu. yd. clam-shell crawler-type gasoline crane with a 40-ft. boom.

During the latter part of 1930 a repair shop large enough to house one of the locomotives was built, and a track was laid into it as shown in Fig. 1. Prior to this time the overhauling of locomotives and hopper cars was carried on with no protection from the weather. Major repairs are now usually carried on during the winter months, so that the added efficiency of the repair crews will repay the cost of this shop building in a short time. This shop, when complete, will have work benches, an air compressor, lathe, forge, tool and supply storage bins, emery wheel, and a water pump.

Water for washing the gravel is pumped from the excavated area near the plant. This source of supply is sufficient except during unusually dry years such as 1930, when it was necessary to use a 4-in. pipe line and pump to bring additional water from the Trinity River. The 8-in. main water supply pump operates at 1,800 r.p.m. against a 65-ft. head to furnish approximately 1,100 gal. per min., or about 500 gal. of water per ton of material washed.

Fuel oil for locomotives and distillate for the drag-lines are bought in car lots and stored in surface tanks till used. During 1930 fuel oil that could be handled without heating was used, but the installation of heating coils in the storage oil tank and the locomotive tenders and the installation of a boiler to heat cars of fuel oil enabled the company to use cheaper and more viscous fuel oil in 1931.

During 1930 the Diesel-engine drag-lines burned an average of 1/10 gal. of distillate per ton of material handled at a cost of \$0.004. The coal-burning steam drag-line while in use averaged 10 lb. of coal per ton of material handled. The average cost of this coal was \$6 per ton, thus the fuel for the steam drag-line cost \$0.03 per ton of material handled.

The locomotives in use in 1930 burned an average of 8 bbl. of fuel oil per 11-hr. shift at an average cost of \$1.07 per bbl., making a fuel-oil cost of \$8.56 per shift. About 1 gallon of locomotive fuel oil costing \$0.025 was used per ton of material handled.

Organization.—The organization of plant personnel is shown in Fig. 6. Night shifts are supervised by the superintendent and general foreman,

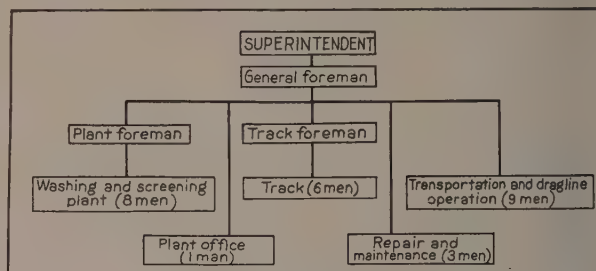


Fig. 6. Organization chart.

with a night foreman in charge. The personnel for the night shift is the same as that for the day shift, except that no track crew is used.

In 1930 the general foreman, foreman, plant-office man, and one mechanic were paid monthly salaries. Machine operators, engineers, plant men, and others employed at the plant were paid an hourly wage ranging from 30 c. for trackmen to 65 c. for drag-line operators.

SUMMARY OF COSTS AT THE CLOUDY PLANT, DALLAS WASHED & SCREENED GRAVEL CO.

Period covered: Jan. 1, 1930 to Dec. 31, 1930. Material loaded: Overburden, 146,000 cu. yd. Sand and gravel, 375,000 tons. Operating costs per dry ton of sand and gravel produced.

	Labor	Supervision	Power	Fuel	Supplies, Repairs	Total
Stripping (cu. yd. of overburden).....	\$0.037	\$0.007		\$0.010	\$0.028	\$0.082
Stripping.....						.031
Excavating and loading gravel.....	.025	.004		.008	.018	.055
Transporting gravel and sand.....	.026	.007		.027	.011	.071
Track expense.....	.020				.004	.024
Washing and screening.....	.057	.009	.013		.022	.101
Miscellaneous items.....					.021	.021
Total operating cost exclusive of depletion and depreciation.....	0.128	0.020	0.013	0.035	0.076	0.303

Summary of Costs in Units of Labor (Man-hours per ton of sand and gravel).

	Stripping	Mining	Transportation	Track	Supervision	Plant
Washing and screening.....						0.142
Excavating and loading.....	0.03	0.05				
Transportation.....			0.057			
Track expense.....				0.06		
Supervision.....					0.004	
Total labor per ton (man-hours).....						0.343
Average production per man per shift (tons).....						32.0
Labor (per cent of total cost).....						42.3

Protection for the Cement Producer vs. Protection for the Buyer

By AMAN MOORE
President, Cement Securities, Ltd.

WHEN John D. Rockefeller receives recognition in the future, after his departure from this life, it will be particularly for his keen grasp of the competitive situation. The same rules that have been applied to the oil industry will apply to every other one of the major industries of this country. Mr. Rockefeller's original idea was chain merchandising and selling of manufactured products of crude oil. By establishing retail facilities over a large territory, prices could be raised or lowered in any one section of such territory without greatly influencing the prices in the surrounding territory. This fact permitted the crushing of any one or more competitors in any one isolated territory by lowering selling prices below cost and maintaining higher prices in other territories. The profits derived from selling over a large territory at one price, netting a good profit, would more than offset the losses sustained by the lowering of prices in another territory. Under such conditions, no matter how strong a competitor might be, if he were compelled to sell at prices below cost, then the larger volume of business he secured, the sooner he became bankrupt.

I remember one instance which occurred in the late 'nineties at Florence, Colorado. One oil concern thrived on high prices, having the only oil refinery at that time in the Rocky Mountain region. Seeing the prosperity of this concern, a rival group of capitalists of Cleveland, O., organized and financed a competitive refinery, which was built some 30 mi. away at Pueblo, Colo., with a pipe-line connecting the oil fields at Florence, Colo. The prices of gasoline were lowered to a point below 5 c. per gal., which at that time did not cover cost. After a fight extending over a few years, the competitive company was completely crushed. The entire plant became a loss and later on was bought in at bankrupt prices by the original company and dismantled.

The question arises whether or not the stockholders in the newer company, who lost their entire investment, should not have been protected under a law that would have prevented the loss of their investment. My contention is that, in instances of this kind, the crime is just as great as if the public had been held up by a monopoly which exercised monopolistic powers and placed the price so high that the profits would be tremendous.

The Sherman and Clayton Acts were passed, primarily, to remedy such situations created by the early operations of the oil interests. They, no doubt, have served their purpose and have protected investors in many instances. However, to-day there are many features of the Sherman and Clay-

ton Acts which tend to prevent the protection of investors in legitimate enterprises when compelled to meet ruinous prices in any one of many industries, wherein there are always some "outlaws" who have no respect whatsoever for their competitors and obtain business mostly by either open or secret price-cutting, which unavoidably precipitates price wars and usually forces down the price below cost and in the end usually wipes out the entire investment.

I well remember an incident of this kind which occurred about 30 years ago in the cement industry. I had established a small plant near Florence, Colo.—at that time the only plant west of Mississippi River other than a small plant at Colton, Cal., which had been built a few years previously. Soon after the Colorado plant was in operation it was discovered that almost all southeastern Kansas was covered with limestone and clays suitable for the manufacture of Portland cement and that beneath was an unlimited supply of free gas tapped and being wasted at the rate of several hundred million cubic feet per day.

The first plant in Kansas was built at Iola and was soon followed by many others. In fact, at one time there were almost one hundred cement-plant projects under way at one time. Only through the publication of the "Cement Bubble" by friends of mine in Kansas City was this great disaster prevented. There were enough plants under promotion at that time to have more than supplied the world with the entire amount of cement consumed.

The little plant in Colorado was running along with a small output of approximately 1,200 bbl. per day, was selling cement at Colorado common points at \$2.65 per bbl., and made some sales at Kansas points at the prices of Kansas companies when shipments were made in mixed cars with plaster products, manufactured also at the Colorado plant.

We of the Colorado company were one day visited by the treasurer, president, chief chemist, and two other officials of a plant in Kansas and we were asked to name a price at which we would sell the Colorado plant. While the plant was running at a good profit no thought had ever been given to selling it. There was approximately \$600,000 invested in the plant by stockholders at that time, and there had been considerably more than that amount of profits reinvested in its enlargement and improvement. Accordingly, after due consideration, a price of \$1,250,000 was named. The president of the Kansas company refused to pay the price and made a counter offer of \$1,000,000. After a day or two of conferences a deadlock was brought about which finally terminated in a threat of the presi-

dent of the Kansas company to put the Colorado company out of business unless the president accepted the price offered by the Kansas company. When this threat was made the president and other officials of the Kansas company were promptly shown the door, and the president of the Colorado company said, "Put us out of business."

The prices of cement at Colorado common points were lowered the following day from \$2.65 per bbl. to \$1.19. At that price the Kansas mills were receiving 55 c. per bbl. f. o. b. mills in Kansas. The remainder of the delivered price was the freight.

A few days later we accepted orders for five carloads in the Kansas plant's territory at a price of \$1.10 per bbl. delivered. These orders were accepted by dealers in the cities of Iola, Topeka and Wichita, Kan., and Kansas City and St. Joseph, Mo. At that price delivered at Kansas points, the Colorado company netted the same as the Kansas plants, 55 c. per bbl. f. o. b. mill at the Colorado plant. No further quotations were made in Kansas because the Kansas company, which had cut the price in Colorado, promptly cut the Colorado price made in Kansas and this precipitated a price war among all the plants in Kansas. The manufacturers were soon selling cement as low as 45 c. at the mill. The Colorado company was fortified by having a large territory in western Colorado, which could only be reached by narrow-gage railroads, and during the next three or four years the average price netted by the Colorado company was \$1.08 at the mill on all sales made. Being favored with fuel prices, which were as low as 10 c. per ton of slack coal, having a 40-c. freight rate per ton on coal delivered at the Colorado plant, with common labor working at \$1.80 per day of 10 hr., and with a soft chalky raw material, which was practically a natural cement mix, the Colorado mill-cost per barrel was kept well below \$1. Consequently, the Colorado plant continued to operate at a profit, which, while small, was in fact sufficiently large to cover earnings on the investment of the stockholders.

The cement plants in Kansas, having cheap or free gas for fuel, soon found that the gas supply became exhausted and they were compelled to use high-priced coal as fuel. At the end of three or four years the officers of the Kansas plants found their companies in bankruptcy. Their average costs per barrel had been approximately 85 c., while their average selling price had been approximately 55 c. per bbl. The result was that every barrel that had been shipped from the plants had cost the stockholders 30 c. more than they received.

After continuing this ruinous practice over a period of three or four years the entire capital of the companies as represented by the investment of the stockholders, also their surplus at the time the price war began, was completely wiped out. Most of the plants were sold at sheriffs' sales under the bankruptcy act. If I remember correctly, the original plant at Iola, the officers of which company had precipitated the price-war, was sold at auction sale along with three other Kansas plants, which

were bid in at a price of approximately \$250,000 for the four plants. Many of the plants were dismantled. The other plants, after going into the hands of new interests, with new capital, were afterward rehabilitated and are to-day in strong hands and are operating successfully.

Of course, it goes without saying that soon after the wind-up of the officers in charge at the time the price-war was started, and after the plants were placed in the hands of new managers the price-war between Colorado and Kansas was discontinued. The plants in both states since that date have been receiving fair prices, which have remained stabilized largely by the increase of the freight rates on cement between Colorado and Kansas and between Kansas and Colorado, also between Kansas and points west of Colorado. At the present time it is possible for Kansas mills to ship to a point only about half-way between the Colorado mills and the Kansas mills and for the Colorado mills to ship half-way to the Kansas mills. Hence, the railroad rates make a natural barrier to prevent future price-wars between Kansas and Colorado mills.

My contention is that the officers who precipitated the price-war, as above related, committed as great a crime as if they had perpetuated an actual robbery, which would have been a felony. Stringent laws should prevent such acts. It is just as great a crime to wipe out by recognized "free competition" the stockholders' investment in any corporation as it is to bunco them in a fake investment. There should be laws which, instead of making it a crime to have competitors fix reasonable prices on any given commodity, should enable the government to create machinery which would assist in stabilizing the prices of commodities, just as it now assists in the stabilization of railroad freight rates through the Interstate Commerce Commission, and in the stabilization of the prices of wheat, cotton and other farm products through the machinery of the Farm Board.

I do not advocate the repeal of the Sherman and Clayton Acts for, as stated above, there are abuses, such as took place in the early stages of the oil industry, that should be barred by law. If anything, more stringent laws should be enacted to curb the practice of one competitor deliberately and purposely attempting to wipe out and ruin his competitor by cutting prices below cost, merely because of the fact that his financial resources are greater than those of his weaker competitor and he is therefore able to sell goods below cost for a longer period of time than his competitor. Such a practice should be a criminal offense against industry and should be condemned as such, especially when such ruinous and deliberate practices are carried on for the purpose of obtaining a monopoly on any one particular commodity. While many features of the Sherman and Clayton Acts should be preserved for the protection of individual producers in all lines of industry, at the same time many other features should be eliminated and new laws passed to create machinery to enable the stabilizing of prices in all lines of industry. Stabilizing of prices, of course,

means the fixing of the price on a definite basis; the prorating of tonnage or volume of business based on the capacity of the producing plants; the restricting of territories; and assistance in other ways. These acts, if done under the Sherman and Clayton Acts, mean the violation of law and would subject participating individuals to both heavy fines and imprisonment. It is certainly a strange procedure when producers in some industries are protected by law for committing certain acts, and others, in different industries, will be punished for the violation of law when performing similar acts and convicted as felons and also subjected to heavy fines. The stabilizing of the railroad business by legalizing and fixing the freight rates of various competitive railroads and, in fact, making it illegal without the consent of the Interstate Commerce Commission to raise a rate or lower a rate or interfere with the stabilized rates which are fixed by such commission created by the federal government, protects the public against unfair practices and too high rates being made by the railroads and protects the railroads from competing among themselves.

In one of the leading western cities a certain dealer became a manufacturer of almost all different building-material products. He ended by manufacturing his own Portland cement. Every product handled by this concern was sold by price-cutting. The institution was called a "department store" for building materials. The price of steel for reinforced-concrete construction, of plaster, lime, lath, stucco, and cement was demoralized by this one concern. Its operations were probably the cause of the failure of many other dealers handling one or more of the same products. Finally, there came a price-war in cement which caused the manufacturers in the district several millions of dollars' loss in profits over a period of a year or more. The concern had created a gigantic menace, which practically demoralized prices in all lines of building material. In the end the manufacturers of the various products, including the cement manufacturers, formed a pool and paid a huge price, amounting to several millions of dollars, in order to eliminate this unfair competition. It is the only incident that I have ever known wherein a single concern was able to set up a menace to all its competitors and then cash in at a huge profit.

Probably the most persistent and most harmful of price-outlawry I have known in the Portland-cement business is the case of an old "original" manufacturer attempting to retain all the market even though the market increased. This "original" manufacturer attempted, by increasing his plant, to take all the cement business in his territory. The manufacturer seemed to resent the efforts of any others who attempted to build new plants to share the local market with him. In his attempts to retain the bulk of the market, he proceeded to announce a price 10 c. below the market, regardless of what the market might be. Such competition is the most disastrous of all types. Sooner or later, in attempting to monopolize the market at a flat

cut of 10 c. below under all competitors' prices, the market bottom is reached.

At the time of the incident I have just related the "original" manufacturer had built up a cash surplus amounting to many millions of dollars and drew on this surplus when the occasion demanded. Of course, with such strength, he usually was able to dominate the situation by intimidating his competitors in the same district. He used his surplus to secure the aid of bankers in getting orders for cement. Huge deposits were carried at probably fifty banks in the marketing district, and, hence, the manufacturer used the officers of each of these banks as under-cover salesmen and assistants in securing orders for cement. It goes without saying that the banker is always susceptible to flattery and when given a large cash deposit, on a checking account without interest payments, he is inclined to go out and work for the party who is his benefactor. It is my opinion that this type of competition is growing more and more and is really one of the worst types of unfair competition that has recently developed in business.

There should be some law that would prevent the "original" manufacturer from attempting to retain all the market by cutting his price under his competitors' prices and thereby hoping to build up a huge plant. The desire seems to be to provide huge capacity, quality sufficient only to pass "standard specifications," to cut prices to obtain volume, and to invoke the aid of subsidized banks and bankers.

In reciting the above instances we have mentioned four types of market "outlaws":

1. The case wherein prices were demoralized in order to force a competitor to sell his plant at a lower price than he desired.

2. The case where a competitor was completely annihilated with a total loss to the investor.

3. The building up of a menace through cut prices and demoralizing of the market, in order to sell out at a huge profit to competitors.

4. The "market hog," who attempts to monopolize the market without permitting competitors in the field.

Certain protection is now given in some of these cases through the Clayton and Sherman Acts. Such protection should be strengthened and not weakened by the repeal of these acts. Through a supreme-court decision the cement companies are already permitted to conduct information bureaus, wherein each competitor in any territory can secure information about all quotations, the price at which cement is sold, and the amount sold by all competitors from day to day. Such bureaus can therefore be operated under the law and a complete record of the acts of all competitors can be had.

We need new laws to permit (1) price agreements among competitors, (2) the pro-rating of tonnage based on output by competitors, and (3) a division of territory to prevent dumping at cut prices in outside territories where the margin of freight rates is against the factories invading the neighbors' markets in outside territories. Such new laws would necessarily require a dictator ap-

pointed by the several manufacturers in each separate district where plants operate, in order to keep a check and to prevent excessive prices being made or maintained for the protection of the public as well as to prevent the "outlaws" in the business from demoralizing prices.

If the manufacturers themselves are not able to control the situation through a dictator, thereby establishing and maintaining fair prices, then, in that event, it might become necessary for the government to lend its aid by exercising either a partial or total general supervision of prices and sales. Such control or supervision by the government, however, would seem to be unnecessary, at least until after it had first been demonstrated that the manufacturers themselves were not capable of exercising such control on an equitable basis for all concerned.

In a recent editorial it was advocated that the government restrict and even prevent the building of new cement plants except by the consent of a governing commission created by the government. In my opinion such restriction would only mean trouble. It would plainly be a case of confiscation of property without compensation. If people own a deposit of lime rock or a gold mine, they certainly have an inherent right to develop it by building mills or any such other improvements they may see fit for its development. Instead of preventing the building of new plants, which would be as impossible as the attempt to prevent the eucalyptus tree from shedding its bark, we should follow the precedents already established by the oil interests, the steel interests, and many other large interests in the United States. These long ago adopted the system of consolidations, merging, and then regulation of output and sales by the management of such trusts, and, also, the acquiring of the natural undeveloped deposits of raw materials by the merged companies.

Among the early consolidations in the United States was that of the American Smelting & Refining Company. It took over nearly all the smelters operating in the precious-minerals industries in the United States and Mexico. Almost its first act was to close down about one-half of the smelters and to rebuild and modernize the others. The corporation has spent millions of dollars since that time in building new smelters and in junking old, obsolete plants. The United States Steel Corp. has a similar history. The forming of many larger mergers in different industries has followed in the footsteps of the above-mentioned combinations.

What is needed most to stabilize cement-marketing conditions to-day is the forming of one or two, or more, large mergers. One large company could include, perhaps, fifty plants and, after the merger was completed, two-thirds of the plants, which have now become obsolete, could be dismantled. There might be one or more additional smaller mergers of the remaining independent plants, and these mergers could also follow the same procedure. It is my belief that continuing the operation of obso-

lete plants, which form a large part of the total plants operating in the United States to-day, is one of the greatest problems facing the industry. By merging them into huge corporations they can then be wrecked without a great loss to the present holders. On the other hand, if wrecked before merging, it would mean a complete loss to the present owners. If the entire situation is handled as a whole in the forming of such mergers, then the extra load caused by the merged companies' junking the obsolete mills can be carried as good-will on the books of the company. It seems to be the only logical way to eliminate obsolete plants, reducing the output of the entire industry to a point well within the limits of necessity, and to enable the construction of a few new, modern plants, with large units including the most modern type of mills, with long kilns, and with the latest type of closed-circuit grinding units, whereby the manufacturing costs in labor and overhead can be greatly reduced and the quality of the product brought up near to perfection.

The next and most important matter in my opinion will be for the merged companies to provide sufficient capital to purchase most of the suitable remaining limestone deposits still available throughout the country for cement-manufacturing purposes. I do not advocate that this be done all at once, as the total investment would be too great a burden to be carried by manufacturing concerns. What I do advocate is that at least a large percentage of the most important deposits be bought at the time of the merger or mergers, and then a certain amount per barrel cost of production be provided and set aside to be expended each year in acquiring additional deposits throughout the country. So long as there are available undeveloped deposits there will always be found capital to develop them. If a group of individuals makes a big success of a cement plant operating in any particular territory, and if other successful men can acquire a deposit of equal value in the same neighborhood, the temptation becomes so great that capital is provided and an additional plant is built. On the other hand, if sufficient capital is provided to acquire such deposits by the merged companies, it will be a matter of only a few years until all the remaining suitable deposits can be acquired and held for future supply for the merged companies.

This is merely following a well-used policy, already established by many successful large corporations which are the result of mergers in one or more of the many industries of this country. Furthermore, the building of new plants will no longer be such a strong temptation. The few large corporations will then compete with each other in the perfecting of new processes and new equipment, and in the design of more modern plants, so as to reduce their cost of manufacturing, selling, and overhead more and more from year to year. The plan will not dam up the ability of individuals to improve the quality of their product, further to perfect their machinery, and otherwise to reach the ideal of perfection in the quality of the product.

Tentative Standards for Aggregates and Gypsum Prepared by A.S.T.M.

THE following tentative standards have been offered by the various standing committees of the American Society for Testing Materials for criticism before they are adopted as standards. Criticisms of those standards bearing the designations C86, 87, 88 and 89 should be sent to Stanton Walker, secretary of Committee C-9 on Concrete and Concrete Aggregates, 545 Munsey Bldg., Washington, D. C.; those of the standards designated C36 and 37 to H. J. Schweim, secretary of Committee C-11 on Gypsum, 211 W. Wacker Drive, Chicago; and those of the specification designated E17 to F. H. Jackson, chairman of the Section on Coarse Screens of Technical Committee III on Size and Shape, of Committee E-1, U. S. Bureau of Public Roads, Washington, D. C.

Apparent Specific Gravity of Coarse Aggregates in a Saturated Condition. (A.S.T.M. Designation: C 86-31 T.)

1. This method is intended for determining the apparent specific gravity of coarse aggregates in a saturated condition.

2. The sample, weighing 1,000 g., shall consist of pieces approximately cubical or spherical in shape and retained on a screen having approximately $\frac{3}{8}$ -in. square openings. In the case of homogeneous material, the smallest particles in the sample may be retained on a screen having 1-in. square openings.

3. The sample shall be immersed in water for 24 hr. and the individual pieces surface-dried with the aid of a towel or blotting paper, and weighed. Record this weight as weight *B*.

4. The sample shall then be placed in a suitable wire basket of approximately $\frac{1}{4}$ -in. mesh, suspended in water—the basket may be conveniently suspended by means of a fine wire hung from a hook shaped in the form of a question mark with the top end resting on the center of the scale pan—from the center of the scale pan, and weighed. Record the difference between this weight and the weight of the empty basket suspended in water as weight *C*, that is, the weight of the saturated sample immersed in water.

5. The apparent specific gravity shall be calculated by dividing the weight in air of the sample saturated for 24 hr. and then surface-dried (*B*) by the difference between the weights of the saturated sample in air (*B*) and in water (*C*) as follows:

$$\text{Apparent specific gravity in saturated condition} = \frac{B}{B-C}$$

NOTE.—Attention is called to the distinction between apparent specific gravity and true specific gravity. Apparent specific gravity includes the voids in the specimen and is therefore always less than or equal to, but never greater than, the true specific gravity of the material.

Structural Strength of Fine Aggregate Using Constant Water-Cement-Ratio Mortar. (A.S.T.M. Designation: C 87-31 T.)

1. This test is intended for determining the "structural strength" of sands to be used as fine aggregate in concrete by means of a compression test on a mortar of plastic consistency and gaged to a definite water-cement ratio.

2. Cement and water in quantities¹ which will give a water-cement ratio of 0.9 shall be placed in an appropriate vessel² and the cement permitted to absorb water for 1 min. The materials shall then be mixed with a spoon² into a smooth paste. Sand from a sample of known weight¹ shall then be beaten into the mixture until the material appears to be of the desired consistency (flow 100 ± 5). The mixing shall be continued for $\frac{1}{2}$ min. and a determination of the flow made.

3. The consistency shall be measured by use of the 10-in. flow-table consisting of a circular bronze plate 10 in. in diameter, so mounted that the surface is level, and equipped with a mechanism for raising the plate $\frac{1}{8}$ in. and allowing it to fall without cushioning. A right truncated cone, $2\frac{3}{4}$ in. in diameter at the top, 4 in. in diameter at the bottom, and 2 in. in height, shall be used to measure the volume of the mortar for the test. Immediately after mixing, the mortar shall be placed in the cone which has been carefully centered on the flow-table. The mortar shall be rodded 25 times with a $\frac{3}{8}$ -in. rod, the surplus struck off, the plate wiped clean, the cone removed, and the table given 30 drops in 30 sec. The percentage of increase in the diameter of the base of the pat, measured on two diameters at right angles to each other, shall be the flow.

4. Should the flow be too great, the mortar may be returned to the mixing vessel, additional sand added, and another determination of the flow made. If the mortar is too dry, the batch shall be discarded. The quantity of sand used shall be determined by subtracting the weight of the portion remaining after mixing from the weight of the initial sample.

5. Immediately following the determination of the flow, the mortar shall be placed in 2-in. by 4-in. cylindrical molds in three layers, or 2-in. cubes in two layers, each layer rodded in place with 25 strokes of a $\frac{3}{8}$ -in. rod, and the mold filled to overflowing. The specimens shall be placed in a moist closet for curing. Three to four hours after molding the specimens shall be struck off to a smooth surface. Twenty to twenty-four hours after molding, the specimens shall be removed from the molds and stored in water until tested.

6. The temperature of the mixing water, moist closet, and storage tank shall be maintained between 65 and 75 deg. F.

¹ For six 2-in. cubes 600 g. of cement and 359 cc. of water will usually give sufficient mortar. The quantity of sand used with this amount of cement may vary from 1,200 g. for fine sand to 2,000 g. or more for coarse sand.

² The vessel used is an ordinary sauce-pan of 4-qt. capacity, 9 $\frac{1}{2}$ in. in diameter at the top and 4 $\frac{1}{2}$ in. high. The spoon is a large iron kitchen spoon.

7. If the specimens are cylindrical, they shall be carefully capped with plaster of Paris before testing. Cubes made in suitable molds need not be capped and shall be tested at right angles to the direction of molding.

*Soundness of Fine Aggregates by Use of Sodium Sulphate.*³ (A.S.T.M. Designation: C 88-31 T.)

1. This method of test is intended for testing fine aggregates to determine their resistance to a solution of sodium sulphate.

NOTE.—The results obtained with this test method shall be considered only as a guide in the selection of aggregates. It is not intended that the test shall be used as an arbitrary basis for rejection of the material without taking other factors into account; consideration should be given to the results obtained with the material when exposed to actual weathering conditions.

Apparatus

2. Suitable containers for immersing the samples of aggregate in the solution in accordance with the procedure hereinafter described shall be selected. The containers should be nonmetallic or of metal not subject to corrosion by sodium sulphate.

NOTE.—No standard form of container is recommended since different practices will be most convenient in various laboratories, and the committee does not feel that this question, except for obvious fundamentals, is of importance. Two general methods of immersion have been used as follows:

(1) Each sample placed in a water-tight container and covered with the sodium-sulphate solution.

(2) Each sample placed in a container with a wire-mesh bottom and immersed in a vat containing the sodium-sulphate solution. Care should be taken to prevent loss by floatation if uncovered containers are submerged.

3. Suitable means for regulating the temperature of the sodium-sulphate solution during the immersion of the samples shall be provided.

4. A balance having a capacity not less than 500 g., sensitive to at least 0.1 g., shall be used.

5. The drying oven shall provide a free circulation of air through the oven and shall be capable of maintaining a temperature of 105 to 110 deg. C. (221 to 230 deg. F.).

6. The sodium-sulphate solution shall be saturated by dissolving the salt, either of the anhydrous (Na_2SO_4) or crystalline ($\text{Na}_2\text{SO}_4 \cdot 10 \text{H}_2\text{O}$) form, in water at a temperature of 24 to 27 deg. C. (75 to 80 deg. F.). The solution shall be thoroughly stirred during the addition of the salt and sufficient excess salt shall be added to insure saturation. About 500 g. of the anhydrous form or 1000 g. of the decahydrate will be required for each liter of water. The solution shall be allowed to cool before use to a temperature of 21 deg. C. $\pm$ 1 deg. C. (70 deg. F. $\pm$ 2 deg. F.).

Test Sample

7. Fine aggregate for the test shall be passed through a $\frac{3}{8}$ -in. sieve. The sample shall be of such size that it will yield not less than 100 g. of each of the following sizes present in amounts of 5 per cent. or more, expressed in terms of sieves conforming to the Standard Specifications for Sieves for Testing Purposes (A.S.T.M. Designation: E 11) of the American Society for Testing Materials:⁴

Retained on Sieve No. 50, passing Sieve No. 30

Retained on Sieve No. 30, passing Sieve No. 16

Retained on Sieve No. 16, passing Sieve No. 8

Retained on Sieve No. 8, passing Sieve No. 4
Retained on Sieve No. 4, passing $\frac{3}{8}$ -in. Sieve

Should the fine aggregate contain less than 5 per cent. of any of these sizes, that size shall not be tested but, for the purpose of calculating the test results, shall be considered to have the same loss in sodium-sulphate treatment as the average of the sizes tested.

8. The sample shall be thoroughly washed on a No. 50 sieve and dried to constant weight at a temperature of 105 to 110 deg. C. (221 to 230 deg. F.), and separated into the different sizes by sieving as follows:

Make a rough separation of the graded sample by means of a nest of the standard sieves specified in 7. From the fractions obtained in this manner select samples of sufficient size to yield 100 g. after sieving to refusal. In general, a 110-g. sample will be sufficient. Fine aggregate sticking in the meshes of the sieves shall not be used in preparing the samples. Samples consisting of 100 g. shall be weighed out of each of the separated fractions after final sieving and placed in separate containers for the test.

Procedure

9. The samples shall be immersed in the prepared solution of sodium sulphate in such a manner that the solution covers them to a depth of at least $\frac{1}{2}$ in. The containers should be covered to reduce evaporation and prevent the accidental addition of extraneous substances. The immersed samples shall be maintained at a temperature of 21 deg. C. $\pm$ 1 deg. C. (70 deg. F. $\pm$ 2 deg. F.) for a period of 18 hr.

NOTE.—A moist room, such as is used for curing concrete and mortar test specimens, offers a convenient means of controlling the storage temperature. The presence of a few crystals of sodium-sulphate in the container is essential to keeping the solution saturated.

10. After the 18-hr. immersion period the aggregate samples shall be removed from the solution and placed in the drying oven. The oven shall have been brought previously to a temperature of 105 to 110 deg. C. (221 to 230 deg. F.). Care shall be exercised to avoid loss of any of the aggregate particles or detritus coarser than a No. 100 sieve. The samples shall be dried to constant weight at the specified temperature. After drying, the samples shall be allowed to cool to within the range of the temperature permissible for the solution in which they are to be immersed, when they shall again be immersed in the prepared solution as described in 9.

11. The process of alternate immersion and drying shall be repeated until the required number of cycles is obtained. Unless otherwise specified, five cycles shall constitute a test.

12. The examination of the test sample shall be made as follows:

(a) After the completion of the final cycle and after the sample has cooled, the sodium sulphate shall be washed from the sample by means of warm water. This shall be done by soaking the sample in fresh, clean, warm water for approximately 1 hr., decanting the liquid and repeating this operation at least four times. Materials of high absorption

³ Accepted for publication as tentative by Committee E-10 on Standards, Aug. 6, 1931.

⁴ 1930 Book of A.S.T.M. Standards, Part II, p. 1,119.

may require a still greater number of washings.

NOTE.—The operator should assure himself that this procedure washes the sample free of sodium sulphate by testing the wash water from each sample. Barium chloride (BaCl_2) solution will cause a precipitate if sodium sulphate is present.

(b) After the sodium sulphate has been removed, each fraction of the sample shall be dried to constant weight at a temperature of 105 to 110 deg. C. (221 to 230 deg. F.), weighed and screened over the same sieve on which it was retained before the test. The particles retained on the sieve shall be weighed and the weight recorded.

NOTE.—In addition to the procedure described in (a) and (b) the following is suggested as giving additional information of value:

Each fraction should be examined visually in order to determine if there is any evidence or excessive splitting of the sand grains.

After treating each separate fraction of sample as described in (b), all sizes, including the detritus, shall be combined and a sieve analysis made using as many of the following sieves as are required: Nos. 100, 50, 30, 16, 8, 4. The results of the sieve analysis shall be recorded as cumulative percentages retained on each sieve.

Report

13. The report shall include the following:

(a) Weight of each fraction of the sample before the test.

(b) Material from each fraction of sample, finer than the sieve on which the fraction was retained before the test, expressed as a percentage by weight of the fraction.

(c) Weighted average calculated from the percentages of loss for each fraction and based on the grading of the sample as received for examination.

*Soundness of Coarse Aggregates by Use of Sodium Sulphate.*⁵ (A.S.T.M. Designation: C 89-31 T.)

1. This method of test is intended for testing coarse aggregates to determine their resistance to a solution of sodium sulphate.

NOTE.—The results obtained with this test method shall be considered only as a guide in the selection of aggregates. It is not intended that the test shall be used as an arbitrary basis for rejection of the material without taking other factors into account; consideration should be given to the results obtained with the material when exposed to actual weathering conditions.

Apparatus

2. Suitable containers for immersing the samples of aggregate in the solution in accordance with the procedure hereinafter described shall be selected. The containers should be nonmetallic or of metal not subject to corrosion by sodium sulphate.

NOTE.—No standard form of container is recommended since different practices will be most convenient in various laboratories, and the committee does not feel that this question, except for obvious fundamentals, is of importance. Two general methods of immersion have been used as follows:

(1) Each sample placed in a water-tight container and covered with sodium-sulphate solution.

(2) Each sample placed in a perforated container and immersed in a vat containing the sodium-sulphate solution.

3. Suitable means for regulating the temperature of the sodium sulphate solution during the immersion of the samples shall be provided.

4. A balance having a capacity not less than 5,000 g., sensitive to at least 1 g., shall be used.

5. The drying oven shall provide a free circula-

tion of air through the oven and shall be capable of maintaining a temperature of 105 to 110 deg. C. (221 to 230 deg. F.).

6. The sodium-sulphate solution shall be saturated by dissolving the salt, either of the anhydrous (Na_2SO_4) or crystalline ($\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$) form, in water at a temperature of 24 to 27 deg. C. (75 to 80 deg. F.). The solution shall be thoroughly stirred during the addition of the salt and sufficient excess salt shall be added to insure saturation. About 500 g. of the anhydrous form or 1,000 g. of the decahydrate will be required for each liter of water. The solution shall be allowed to cool before use to a temperature of 21 deg. C. $\pm$ 1 deg. C. (70 deg. F. $\pm$ 2 deg. F.).

Test Sample

7. The coarse aggregate for the test shall consist of material from which the sizes finer than the No. 4 sieve have been removed. The sample shall be of such a size that it will yield not less than the following amounts of the different sizes present in amounts of 5 per cent. or more:

No. 4 to $\frac{3}{8}$ -in. size (square openings).....	100 g.
$\frac{3}{8}$ to $\frac{1}{2}$ -in. size (square openings).....	300 g.
$\frac{1}{2}$ to $1\frac{1}{2}$ -in. size (square openings).....	1,500 g.
$1\frac{1}{2}$ to $2\frac{1}{2}$ -in. size (square openings).....	3,000 g.
Larger sizes by 1-in. spread in sieve size.....	3,000 g.

Should the sample of coarse aggregate contain less than 5 per cent. of any of these sizes, that size shall not be tested but, for the purpose of calculating the test results, shall be considered to have the same loss in sodium-sulphate treatment as the average of the sizes tested.

8. For making the sodium-sulphate test on ledge rock, the sample shall be prepared by breaking it into fragments such that the weights of the fractions specified in 7 smaller than $2\frac{1}{2}$ in. may be procured. The mechanical analysis of the entire sample of broken fragments shall be obtained after first sieving the sample through the $2\frac{1}{2}$ -in. sieve and rejecting the material passing the No. 4 sieve. The test shall then be made as described in 9 to 14, using the mechanical analysis of the broken fragments for the purpose of weighting the percentages of loss of the several fractions.

The sample shall be thoroughly washed and dried to constant weight at a temperature of 105 to 110 deg. C. (221 to 230 deg. F.), and separated into the different sizes by screening to refusal. The proper weight of sample for each fraction shall be weighed out and placed in separate containers for the test. In the case of fractions coarser than the $\frac{3}{4}$ -in. sieve, the number of particles shall be counted.

Procedure

9. The samples shall be immersed in the prepared solution of sodium sulphate in such a manner that the solution covers them to a depth of at least $\frac{1}{2}$ in. The containers should be covered to reduce evaporation and prevent the accidental addition of extraneous substances. The immersed samples shall be maintained at a temperature of 21 deg. C. $\pm$ 1 deg. C. (70 deg. F. $\pm$ 2 deg. F.) for a period of 18 hr.

NOTE.—A moist room, such as is used for curing concrete and mortar test specimens, offers a convenient means of controlling the storage temperature. The presence of a few

⁵ Accepted for publication as tentative by Committee E-10 on Standards, Aug. 6, 1931.

crystals of sodium sulphate in the containers is essential to keeping the solution saturated.

10. After the 18-hr. immersion period the aggregate samples shall be removed from the solution and placed in the drying oven. The oven shall have been brought previously to a temperature of 105 to 100 deg. C. (221 to 230 deg. F.). Care shall be exercised to avoid loss of any aggregate particles.⁶ The samples shall be dried to constant weight at the specified temperature. After drying, the samples shall be allowed to cool to within the range of temperature permissible for the solution in which they are to be immersed, when they shall again be immersed in the prepared solution as described in 9.

11. The process of alternate immersion and drying shall be repeated until the required number of cycles is obtained. Unless otherwise specified, five cycles shall constitute a test.

12. Fractions of samples coarser than $\frac{3}{4}$ in. shall be examined qualitatively after each immersion and quantitatively at the completion of the test. Fractions finer than $\frac{3}{4}$ in. shall be examined quantitatively only, and after the completion of the test.

13. The qualitative examination and record shall consist of: (1) observing the effect of action by the sodium sulphate solution and the nature of the action, and (2) counting the number of particles affected.

NOTE.—Many types of action may be expected. In general, they may be classified as disintegration, splitting, crumbling, crackling, flaking.

14. The quantitative examination shall be made as follows:

(a) After the completion of the final cycle and after the sample has cooled, the sodium sulphate shall be washed from the sample by means of warm water. This shall be done by soaking the sample in fresh, clean, warm water for approximately 1 hr., decanting the liquid and repeating this operation at least four times. Materials of high absorption may require a greater number of washings.

NOTE.—The operator should assure himself that this procedure washes the sample free of sodium sulphate by testing the wash water from each sample. Barium chloride (BaCl_2) solution will cause a precipitate if sodium sulphate is present.

(b) After the sodium sulphate has been removed, each fraction of the sample shall be dried to constant weight at a temperature of 105 to 110 deg. C. (221 to 230 deg. F.), weighed and screened over the same sieve on which it was retained before the test. The weight of the material passing the sieve shall be determined and the weight recorded.

NOTE.—While only particles larger than the $\frac{3}{4}$ -in. size are to be examined qualitatively, it is recommended that examination of the smaller sizes be made in order to determine if there is any evidence of excessive splitting.

In addition to the procedure described in (a) and (b) the following is suggested as giving additional information of value: After treating each separate fraction of sample as described in (b) all sizes, including the detritus, shall be combined and a sieve analysis made, using a complete set of sieves for the determination of the fineness modulus. The results of the sieve analysis shall be recorded as cumulative percentages retained on each sieve.

Report

15. The report shall include the following:

(a) Weight of each fraction of the sample before the test.

⁶ The detritus also should be saved if the complete analysis suggested in the Note in 14 (b) is made.

(b) Number of particles in each fraction of the sample coarser than $\frac{3}{4}$ in. before the test.

(c) Number of pieces affected, in fractions coarser than $\frac{3}{4}$ in. only, classified as to the number disintegrated, split, cracked, flaked, etc.

(d) Material from each fraction of the sample, finer than the sieve on which the fraction was retained before the test, expressed as a percentage by the weight of the fraction.

(e) Weighted average calculated from the percentages of loss for each fraction, based on the grading of the sample as received or, in the case of ledge rock, as prepared by breaking it into particles for the test.

Gypsum Wall-Board⁷ (A.S.T.M. Designation: C 36-31 T)

1. Gypsum wall-board is a gypsum plaster board designed to be used, without the addition of plaster, for walls, ceilings or partitions and affording a surface suitable to receive decoration.

Manufacture

2. Gypsum wall-board shall consist of an combustible core of gypsum, with or without fiber, but not exceeding 15 per cent. fiber by weight, and surfaced with paper or other fibrous material firmly bonded to the core.

Properties and Tests

3. When tested either face up or face down in accordance with 14 (below), specimens taken from the gypsum wall-board shall carry not less than the following loads without showing a breaking of the bond between the surfacing and the core:

		Load (lb.)	
Thickness (in.)	(mm.)	Knife Edges Across Fiber of Surfacing	Knife Edges Parallel to Fiber of Surfacing
		50	24
$\frac{1}{4}$	6.3	80	34
$\frac{3}{8}$	9.5	105	45
$\frac{1}{2}$	12.7		

4. At least 1 per cent. of the number of gypsum wall-boards in a shipment, but not less than 10 boards, shall be so selected as to be representative of the shipment. Twenty-five per cent. of such selected boards, but not less than 10 individual boards, shall constitute a sample for the purposes of the test. When a shipment consists of more than one car-load or carrier-load, a sample shall be taken from each car or carrier.

Dimensions, Weights and Permissible Variations

5. The nominal thickness of gypsum wall-board shall be $\frac{1}{4}$ in. (6.3 mm.), $\frac{3}{8}$ in. (9.5 mm.), or $\frac{1}{2}$ in. (12.7 mm.), with permissible variations in the nominal thickness of $\pm 1/64$ in. (0.4 mm.), and with permissible local variations of $\pm 1/32$ in. (0.8 mm.) from the nominal thickness.

6. (a) The nominal width of gypsum wall-board shall be 32 in. (810 mm.), 36 in. (910 mm.) or 48 in. (1220 mm.), with a permissible variation of $3/32$ in. (2 mm.) under the specified width.

⁷ These specifications are in effect a tentative revision of, and will supersede when adopted as standard, the present Standard Specifications for Gypsum Wall-Board (A.S.T.M. Designation: C 36-25), 1930 Book of A.S.T.M. Standards, Part II, p. 114.

(b) Beveled-edge wall-boards may have widths $\frac{1}{4}$ in. (6.3 mm.) less than those specified in (a) with the same permissible variation.

7. The nominal length of gypsum wall-board shall be from 4 ft. (1.22 meters) to 12 ft. (3.66 meters), inclusive, with permissible variations of $\pm \frac{1}{4}$ in. (6.3 mm.) from the specified length.

8. The weight of gypsum wall-board per 1,000 sq. ft. shall conform to the following requirements:

Thickness		Weight (per 1,000 sq. ft.)			
(in.)	(mm.)	Minimum		Maximum	
		(lb.)	(kg.)	(lb.)	(kg.)
$\frac{1}{4}$	6.3	900	408	1,500	680
$\frac{3}{8}$	9.5	1,350	612	2,000	905
$\frac{1}{2}$	12.7	1,800	816	3,000	1,361

Finish

9. The face of gypsum wall-board shall be true and free from imperfections that would render the wall-board unfit for use with or without decoration. The edges and ends shall be straight and solid. The corners shall be square with a permissible variation of $\frac{1}{8}$ in. (3.2 mm.) in the full width of the board.

Packing and Marking

10. Shipments of gypsum wall-board shall conform to the following requirements:

(a) They shall be shipped so as to be kept dry and free from moisture.

(b) When shipped for resale, the following information shall be shown upon each board or package: Name of manufacturer; Brand.

Inspection and Rejection

11. Inspection may be made either at the point of shipment, or at the point of delivery. The inspector representing the purchaser shall have free access to the carriers being loaded for shipment to the purchaser. He shall be afforded all reasonable facilities for inspection and sampling, which shall be so conducted as not to interfere unnecessarily with the loading of the carriers.

12. Any rejections shall be based upon failure to conform to the requirements of these specifications and shall be reported within 10 working days from the receipt of the shipment by the consignee. The notice of rejection shall contain a specific statement of the respects in which the boards have failed to conform to the requirements of these specifications.

13. Claims for rehearing shall be valid only if made within 20 working days from the receipt of notice of specific cause for rejection.

Method of Testing

14. (a) *Test Specimens.*—Test specimens for the flexural-strength test shall be taken from not less than 10 gypsum boards. The test specimens shall be 12 in. (300 mm.) in width and approximately 16 in. (410 mm.) in length. The specimens shall be weighed to within 0.5 g. and then stored at a temperature of from 60 to 85 deg. F. in an atmosphere of 25- to 50-per cent. relative humidity. The specimens shall be weighed once a day until the weight has become constant to within 0.1 per cent.

(b) *Procedure.*—The test specimen shall be centrally supported on fixed parallel bearings spaced 14

in. (350 mm.) between centers and the load-applying block brought in contact with the upper surface of the specimen midway between the supports. All bearings and load surfaces shall be true, shall engage the full width of the test specimen, and shall be rounded to a radius of $\frac{1}{8}$ in. (3.2 mm.). The test load shall be applied at a uniform rate of 60 lb. (27.22 kg.) per min. with a permissible variation of ± 10 per cent. in the rate.

(c) *Report.*—Flexural-strength-test results shall be reported with the load applied across the fiber of the surfacing and also parallel to the fiber of the surfacing.

Gypsum Lath^s (A.S.T.M. Designation: C 37-31 T)

1. Gypsum lath is a gypsum plaster board designed to be used as a base for the reception of gypsum plaster.

Manufacture

2. Gypsum lath shall consist of an incombustible core of gypsum, with or without fiber, but not exceeding 15 per cent. fiber by weight, and surfaced with paper or other fibrous material firmly bonded to the core.

Properties and Tests

3. When tested either face up or face down in accordance with 14 (below), specimens taken from the gypsum lath shall carry not less than the following loads without showing a breaking of the bond between the surfacing and the core:

Thickness		Load (lb.)	
(in.)	(mm.)	Knife Edges Across Fiber of Surfacing	Knife Edges Parallel to Fiber of Surfacing
$\frac{1}{4}$	6.3	40	16
$\frac{3}{8}$	9.5	60	27
$\frac{1}{2}$	12.7	100	40

4. At least 1 per cent. of the number of gypsum laths in a shipment, but not less than 10 laths, shall be so selected as to be representative of the shipment. Twenty-five per cent. of such selected laths, but not less than 10 individual laths, shall constitute a sample for the purposes of a test. When a shipment consists of more than one car-load or carrier-load, a sample shall be taken from each car or carrier.

Dimensions, Weights and Permissible Variations

5. The nominal thickness of gypsum lath shall be $\frac{1}{4}$ in. (6.3 mm.), $\frac{3}{8}$ in. (9.5 mm.), or $\frac{1}{2}$ in. (12.7 mm.), with permissible variations in the nominal thickness of $\pm 1/32$ in. (0.8 mm.) and with permissible local variations of $\pm 1/16$ in. (1.6 mm.) from the nominal thickness.

6. The nominal width of gypsum lath shall be 16 in. (406.4 mm.), 24 in. (610 mm.) or 32 in. (810 mm.), with permissible variations of $\frac{1}{4}$ in. (6.3 mm.), under, and $\frac{1}{8}$ in. (3.2 mm.) over the specified width.

7. The nominal length of gypsum lath shall be 32 in. (810 mm.), 36 in. (910 mm.) or 48 in. (1220 mm.), with permissible variations of $\frac{1}{4}$ in. (613

^s These specifications are in effect a tentative revision of, and will supersede when adopted as standard, the present Standard Specifications for Gypsum Plaster Board (A.S.T.M. Designation: C 37-30), 1930 Book of A.S.T.M. Standards, Part II, p. 117.

mm.) under, and $\frac{1}{8}$ in. (3.2 mm.) over the specified length.

8. The weight of gypsum lath per 1,000 sq. ft. shall conform to the following requirements:

Thickness		Weight (Per 1,000 Sq. Ft.)			
(in.)	(mm.)	Minimum		Maximum	
		(lb.)	(kg.)	(lb.)	(kg.)
$\frac{1}{4}$	6.3	900	408	1,500	680
$\frac{3}{8}$	9.5	1,350	612	2,000	907
$\frac{1}{2}$	12.7	1,800	816	3,000	1,361

Finish

9. The surfaces of gypsum lath shall be such that they will readily receive and retain gypsum plaster. The edges and ends shall be straight and solid. The corners shall be square with a permissible variation of $\frac{1}{4}$ in. (6.3 mm.) in the full width of the lath. Gypsum laths shall be free from cracks and imperfections that will render them unfit for use.

NOTE.—Gypsum laths that have their corners burred or broken shall be considered acceptable, provided that the broken portion is not more than 1 in. (25.4 mm.) along either dimension.

Packing and Marking

10. Shipments of gypsum lath shall conform to the following requirements:

- They shall be shipped so as to be kept dry and free from moisture.
- When shipped for resale, the following information shall be shown upon each lath or package: Name of manufacturer; Brand.

Inspection and Rejection

11. Inspection may be made either at the point of shipment or at the point of delivery. The inspector representing the purchaser shall have free access to the carriers being loaded for shipment to the purchaser. He shall be afforded all reasonable facilities for inspection and sampling, which shall be so conducted as not to interfere unnecessarily with the loading of the carriers.

12. Any rejection shall be based upon failure to conform to the requirements of these specifications; and shall be reported within 10 working days from receipt of the shipment by the consignee. The notice of rejection shall contain a specific statement of the respects in which the laths have failed to conform to the requirements of these specifications.

13. Claims for rehearing shall be valid only if made within 20 working days from the receipt of notice of specific cause for rejection.

Method of Testing

14. (a) *Test Specimens.*—Test specimens for the flexural-strength test shall be taken from not less than 10 gypsum laths. The test specimens shall be 12 in. (300 mm.) in width and approximately 16 in. (410 mm.) in length. The specimens shall be weighed to within 0.5 g. and then stored at a temperature of from 60 to 85 deg. F. in an atmosphere of 25- to 50-per cent. relative humidity. The specimens shall be weighed once a day until the weight has become constant to within 0.1 per cent.

(b) *Procedure.*—The test specimen shall be cen-

trally supported on fixed parallel bearings spaced 14 in. (350 mm.) between centers and the load-applying block brought in contact with the upper surface of the specimen midway between the supports. All bearings and load surfaces shall be true, shall engage the full width of the test specimen, and shall be rounded to a radius of $\frac{1}{8}$ in. (3.2 mm.). The test load shall be applied at a uniform rate of 60 lb. (27.22 kg.) per min. with a permissible variation of ± 10 per cent. in the rate.

(c) *Report.*—Flexural-strength-test results shall be reported with the load applied across the fiber of the surfacing and also parallel to the fiber of the surfacing.

Round-Hole Screens for Testing Purposes (A.S.T.M. Designation: E 17-31 T)

1. These specifications cover testing screens for use in the classification of materials according to size in all cases where specifications call for use of screens having circular openings.

2. Plates used in the manufacture of screens shall be made of brass, bronze, steel or other rigid metal. Thickness of plates shall be governed by size of openings as well as screening area of screens and shall conform to the following requirements:

Screening Area (sq. in.)	Size of Opening (in.)	Thickness (in.)
Under 100	All sizes	0.0500
100 and over	$\frac{1}{16}$ to $\frac{1}{8}$	0.0500
	$\frac{1}{8}$ to $2\frac{1}{2}$	0.0625
	Over $2\frac{1}{2}$	0.0781

3. Frames for laboratory screens 8 in. in diameter shall be of metal at least $2\frac{1}{2}$ in. in height, and sufficiently rigid to resist distortion. Frames for large screens may be of either hardwood or metal and may be square, rectangular or circular, as specified.

4. (a) Spacing of openings for all screens shall conform to the following requirements:

Diameter of Opening (in.)	Distance Center to Center of Openings (in.)	Diameter of Opening (in.)	Distance Center to Center of Openings (in.)
$\frac{1}{8}$	$\frac{7}{16}$	1	$1\frac{3}{8}$
$\frac{1}{4}$	$\frac{1}{2}$	$1\frac{1}{4}$	$1\frac{1}{2}$
$\frac{3}{8}$	$\frac{5}{8}$	$1\frac{1}{2}$	2
$\frac{1}{2}$	$\frac{3}{4}$	2	$2\frac{1}{2}$
$\frac{5}{8}$	$\frac{7}{8}$	$2\frac{1}{2}$	$3\frac{1}{4}$
$\frac{3}{4}$	1	3	$3\frac{3}{4}$
$\frac{7}{8}$	$1\frac{1}{8}$	$3\frac{1}{2}$	$4\frac{1}{4}$
		4	$4\frac{3}{4}$

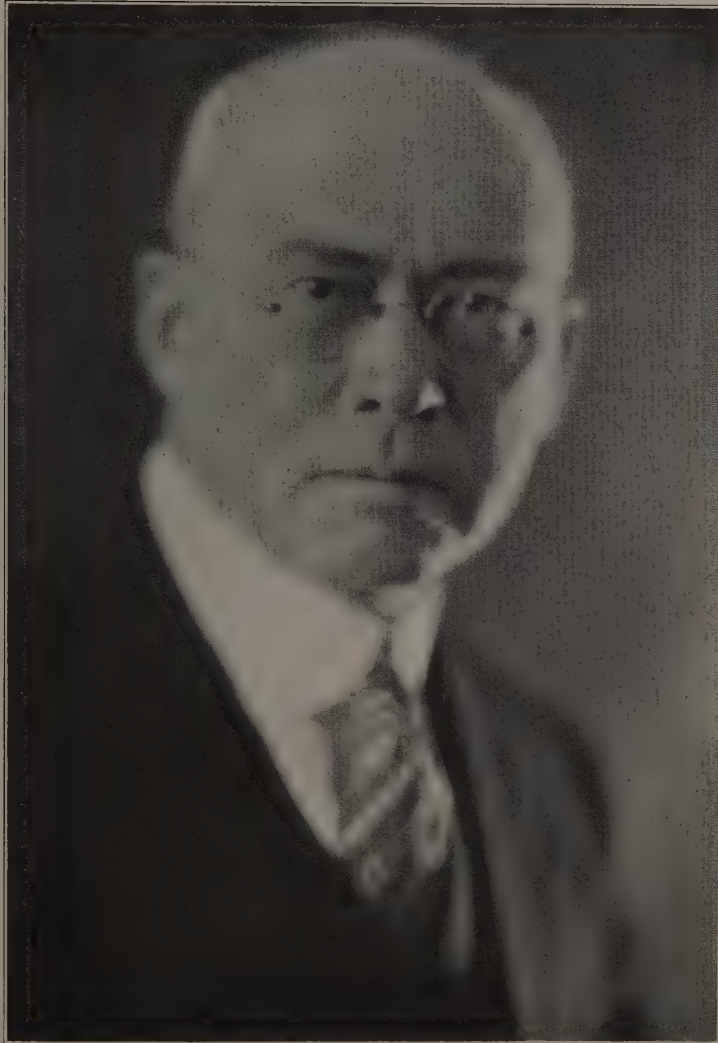
(b) The openings in the screen plate shall be so arranged that when spaced according to the requirements of 4 (a) the maximum number possible is obtained.

5. (a) For screens having openings $\frac{1}{4}$ in. or less in diameter, the actual diameter of any opening shall not vary from the nominal diameter more than 5 per cent.

(b) For screens having openings over $\frac{1}{4}$ in. in diameter, the actual diameter of any opening shall not vary from the nominal diameter more than 3 per cent.

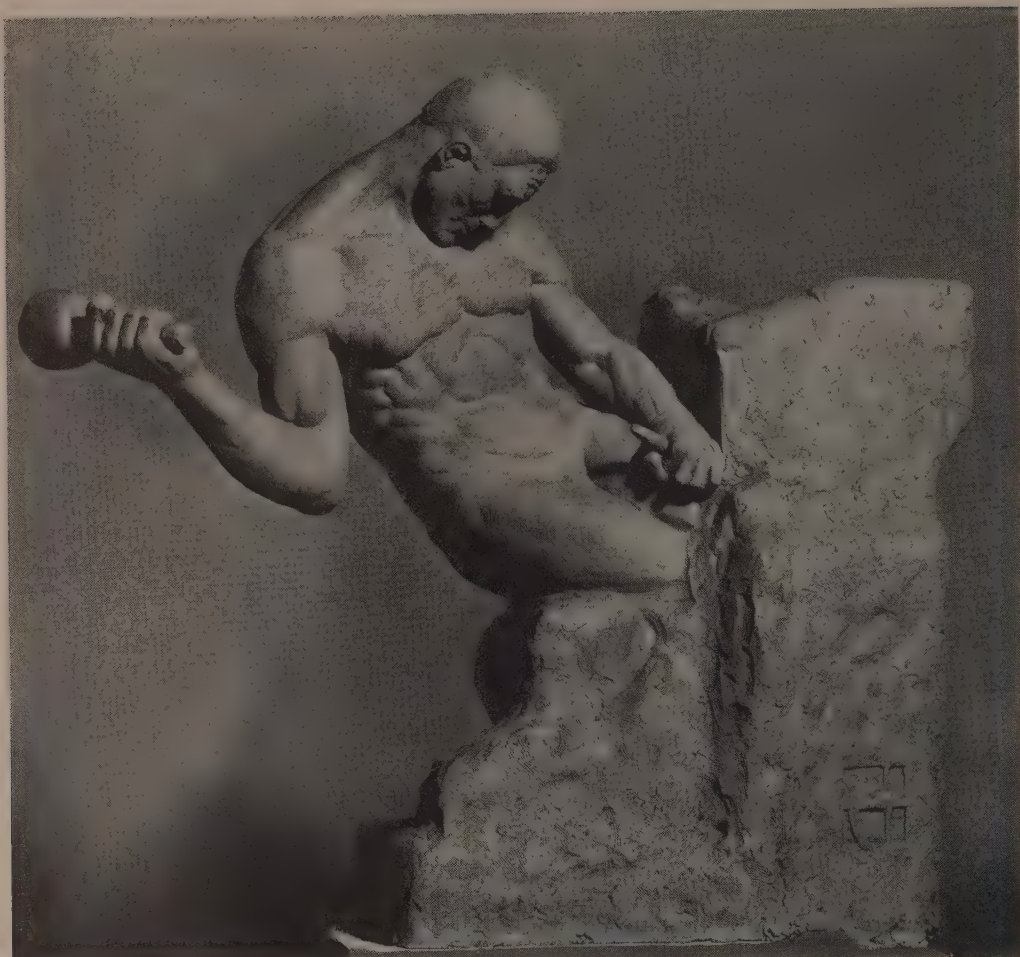
MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.



Drake Photo

G. S. BROWN
President
Alpha Portland Cement Co.
Easton, Pa.



THE BIRTH OF THE INDIANA LIMESTONE INDUSTRY



E. H. DANIELS, Indianapolis sculptor, has completed a working model which he plans to carve in stone depicting the birth of the Indiana limestone industry. In giving form to the idea the young sculptor has designed a giantlike figure who, having lain dormant for years, is seen in the

act of freeing himself from the rock mass which has imprisoned him. While working symbolically, the sculptor has kept in mind the decorative character of the work and has so designed his figure that it will meet both requirements. In symbolizing the growth of Indiana's limestone industry, Mr. Daniels has modeled a figure that is monumental, with simple lines and masses that will readily lend themselves to final carving in stone.

In order to emphasize the symbolical figure in the model and yet keep the work within limited dimensions for exhibition purposes, the rock mass appears much smaller in proportion to the figure than will be the case when the design is executed.

Coming Events

Feb. 11, 1932. St. Louis, Mo. Monthly meeting, St. Louis Quarrymen's Assn., Forest Park Hotel. E. J. McMahon, exec. sec., 4063 Forest Park Blvd., St. Louis, Mo.

Feb. 15-18, 1931. New York, N. Y. One-Hundred and Forty-first Meeting, American Institute of Mining and Metallurgical Engineers, Hotel Commodore.

Feb. 23-26, 1932. Washington, D. C. Annual convention, American Concrete Institute, Wardman Park Hotel. Harvey Whipple, sec., 2970 West Grand Blvd., Detroit, Mich.

March 1-4, 1932. Washington, D. C. Twenty-eighth annual convention, American Concrete Institute. Harvey Whipple, secretary-treasurer, 2970 West Grand Blvd., Detroit, Mich.

Pumpings from the Old Pit

Excerpts from the old files of PIT and QUARRY reveal many interesting side-lights on the activities of the pits, quarries and plants of former days. These are printed in this column each issue.

Fifteen Years Ago

AN article describing the stone-unloading facilities of the Niagara Sand Corp. at Buffalo, N. Y., gave some interesting figures on the cost of unloading the stone from barges to the stock-piles on the dock by a clam-shell crane. The analysis included depreciation and interest on the \$10,000 investment in the crane, labor, maintenance, and expense for fuel and oil. On the basis of 375,000 cu.yd. of material handled yearly, the cost was \$0.017 per cu.yd.

Articles of incorporation were granted the New Jersey Gravel Co. of Atlantic City, N. J. The new firm was capitalized at \$125,000 and its incorporators were George S. Bennett, Richard E. Wheeler, and Edgar D. Deher.

Ten Years Ago

TWO cement mills in the Lehigh Valley district were damaged by fire. The Lehigh Portland Cement Co. plant at Ormrod, Pa., suffered a loss of \$10,000 and the Whitehall Cement Co., whose plant was located near Coplay, Pa., suffered approximately the same amount of damage when one of its storage houses was partially burned.

At the annual meeting of the National Agricultural Limestone Assn., held at Columbus, O., Edgar M. Lamkin was elected president for 1922. Mr. Lamkin was in charge of the agricultural-limestone department of the Kelley Island Lime & Transport Co.

The Cape Girardeau Portland Cement Co. of Cape Girardeau, Mo., announced plans for extensive improvements to increase its production capacity to 2,400 bbl. per day. The work

was to cost about \$130,000. Charles L. Harrison was president of the concern.

Sand-and-gravel business was being maintained on an extensive scale in the Pittsburgh area. The plants and dredges of the Keystone Sand & Supply Co., and J. K. Davison & Bro. Sand Co., two of the leading operators in that district, reported near-capacity operation with sales running correspondingly high.

The following new officers were named by the Indiana Sand & Gravel Producers' Assn. at its 1922 convention held at Indianapolis: M. A. Neville, Indianapolis, president; Geo. J. Nattkemper, Terre Haute, vice-president; and Jesse Shearer, Indianapolis, secretary-treasurer.

The newly-organized Indian Head Trap Rock Co. of Boston, Mass., acquired about 80 acres of deposits near Sherborn, Mass.

Five Years Ago

THE National Crushed Stone Assn. completed one of its best attended and most successful conventions when it held its tenth annual gathering at the Book-Cadillac Hotel at Detroit. Officers chosen for 1927 included Otho M. Graves, president; Canadian vice-president, Charles M. Doolittle; Eastern vice-president, Mortimer Wandell; Central vice-president, G. J. Whelan; Southern vice-president, T. I. Weston; Southwestern vice-president, W. F. Wise; Northern vice-president, W. R. Sanborn; Western vice-president, A. R. Wilson.

Progress in the crushed-stone industry during the decade preceding 1927 was traced in detail in an article by A. T. Goldbeck, director, Bureau of

Engineering, National Crushed Stone Assn.

* * *

New incorporations included the following companies: Mantua Sand & Gravel Co., Mantua, O., \$5,000; Sierra Lime Co., Sacramento, Cal., \$100,000; Beyer Crushed Rock Co., Kansas City, Mo., \$90,000; White Plains Crushed Sand & Gravel Co., Mamaroneck, N. Y., \$15,000; and Moosic Sand & Gravel Co., Scranton, Pa., \$15,000.

Scale Firm Reorganizes; Will Broaden Activities

The American Kron Scale Co., manufacturer of heavy-duty automatic dial scales, has recently been reorganized under the name of The Kron Co. The reorganization was decided upon to provide additional capital for use in broadening the lines of manufacture and increasing the activities of the company. The plant has been moved from its old location in New York to 1720 Fairfield Ave., Bridgeport, Conn.

Richard F. Straw, long associated with the Wright Manufacturing Co., has resigned his position as sales manager to become president of the new organization. Other officers are F. W. De Foe, vice-president, and H. C. Stevenson, secretary and treasurer. George A. Nichols, New York manager of the Wright Manufacturing Co., has also resigned to become associated with the new company in an executive capacity.

New Corporations

PEERLESS CEMENT CORP., Detroit, Mich. Change in capitalization from \$1,200,000 preferred and 1,600,000 shares n.p.v. to \$1,200,000 preferred and 320,000 shares n.p.v.

GREAT WHITE SANDS GYPSUM CO., Wilmington, Del. \$500,000.

KNOXVILLE CRUSHED STONE CO., INC., Nashville, Tenn. \$10,000. A. H. Whisman, W. E. Johnson and W. K. Johnson.

TRI-STATE QUARRY CO., Junction City, Kan. \$120,000. Charles O. Monson, John A. Swenson, H. Leland Enos, V. R. Enos and F. W. Enos.

THE MIDWEST SAND & GRAVEL CO., INC., Minneapolis, Minn. \$100,000. Frank I. Zell, 1811 Second Ave., So., Paul Christopherson and H. A. Cobb.

CASS CITY SAND & GRAVEL CO., Cass City, Mich. Changed capitalization from \$100,000 to 21,000 shares n.p.v.

THE BAKER GRAVEL CO., Sidney, O. O. A. Baker, J. C. McKee, W. E. Baumgardner and R. A. Eshman, Young Bldg., Sidney, O.

ERIE SAND & GRAVEL CO., New York, N. Y. (Hyde Park.) \$30,000.

BATTLE CREEK SAND & GRAVEL CO., Battle Creek, Mich. \$15,000.

Personal Mention

George E. Warren, assistant general manager, Portland Cement Assn., Chicago, has been transferred to San Francisco, where he will reopen the regional office and will carry on work of the association in that territory with the title of acting regional manager, Pacific Coast district.

M. L. Silcox has been appointed safety engineer at Plant No. 8 of the Penn-Dixie Cement Corp. at Valley Junction, Iowa. He succeeds E. N. Dodd.

Clarence E. Searle, general representative of the Allis-Chalmers Manufacturing Co., has resigned to accept the vice-presidency of an eastern firm, his resignation becoming effective January 31. Mr. Searle entered the service of the Allis-Chalmers company in October, 1908. Since 1915 he had been in charge of the sales organization of Allis-Chalmers and has generally directed the sales activities of the Company. Mr. Searle is succeeded by L. W. Grothaus, who has been assistant manager of the electrical department at headquarters in Milwaukee.

W. J. Reeder has been appointed as manager of the St. Louis branch office of Bailey Meter Co. This appointment fills the vacancy made by the untimely death of C. J. Prendergast, which resulted from injuries received in a building collapse at Paoli, Ind., a short time ago. For the past seven years, Mr. Reeder has been connected with the Chicago office of the Bailey Meter Co. where he has had a wide experience in the solution of metering, controlling and regulating problems. Mr. Reeder will be assisted by J. R. Buss, who has been located in the St. Louis district for the past four years.

Charles McDonough has been named publicity manager of Combustion Engineering Corp., succeeding Carl Stripe, who has resigned to publish a new monthly magazine to be known as *Steam Plant Engineering*. Mr. McDonough has been identified with the company for the past fifteen years, having served as assistant publicity manager for some time prior to his present appointment. Mr. Stripe also had long identification with the company, in which he has served in the capacities of field engineer, sales engineer, district sales manager, and for the past five years as publicity manager.

Ed. Johnson, 431 Western Pacific Bldg., Los Angeles, Cal., has taken out a permit for the erection of a \$15,000 rock-crushing plant.



M. I. Dorfman.

M. I. Dorfman has been appointed manager of the Dust Collector Division of Blaw-Knox Co. Mr. Dorfman has just terminated five years as manager of the dust-collector division of the Pangborn Corp. of Hagerstown, Maryland. He was previously in charge of dust-collector sales for the Allis-Chalmers Manufacturing Co. of Milwaukee. The Blaw-Knox Co., after long experiment and research, is entering the dust-collector field with two lines of equipment developed and ready for the market and other lines in process of development.

George H. Bucher has been elected vice-president and general manager of the Westinghouse Electric International Co. Mr. Bucher joined the Westinghouse organization September 1, 1909, as a graduate student. April 1, 1920, he was appointed assistant to general manager of the Westinghouse Electric International Co. In the following year he was appointed assistant general manager, which position he held until his recent appointment.

William E. Umstatt has been made executive vice-president of the Timken Roller Bearing Co., Canton, O. Mr. Umstatt has been with the Timken organization for thirteen years, during the last two years of which he has occupied the capacity of factory manager.

J. D. Harrison, district manager of the Chicago office from 1922 to 1929 of Combustion Engineering Corp., has been reappointed to that position. Mr. Harrison succeeds Hugh R. Carr, who has been transferred to the sales department of the home office at New York as manager of stoker sales.

M. M. Leighton, chief of the Illinois Geological Survey, and C. C. Whittier, consulting engineer of Robert W. Hunt Co., of Chicago, were the principal speakers at the Illinois Conference on Mineral Industries held at La Salle, Ill., on February 5. The meeting was held for the three-fold purpose of urging a complete investigation into the composition and potential economic possibilities of all mineral and rock substances occurring in Illinois; of providing for the study of production and movements of mineral materials both into and out of the state and of all possible marketing opportunities.

Ed Carroll is opening the old Stone Mill Quarry, southwest of Tipton, Ia., and plans the production of crushed stone. The Cedar County Board of Supervisors has contracted for the biggest portion of the output for the present at a price of \$1 per cu. yd., to be used in road-surfacing work.

J. R. Gray has been promoted to the position of district sales manager in charge of eastern Pennsylvania and southern New Jersey territory by the Four Wheel Drive Sales Co. Mr. Gray has been connected with the FWD organization for fourteen years in various capacities, eight years being spent in direct sales work in the Wisconsin division. He will be succeeded in southern Wisconsin by J. J. Kingston, also a veteran of the Wisconsin sales division and formerly in charge of the east-central portion of the state.

Obituary

John J. Horgan, 49, purchasing agent for the Trinity Portland Cement Co., Dallas, Tex., and a member of that organization for twenty years, died early in January. Mr. Horgan was widely known in business and social circles, and was a member of the Purchasing Agents' Assn., Lakewood Athletic Club, and the Dallas Athletic Club. His widow, four brothers and two sisters survive.

William J. Black, age 67, general superintendent of operations for the Moulding-Brownell Corp. of Chicago, died January 15. He had been ill for about one week and heart disease was the cause of death. Mr. Black was well and favorably known in the aggregates-producing industry. Before the Moulding-Brownell consolidation he had been superintendent of the Brownell Improvement Co., having charge of its extensive quarrying operations at Thornton, Ill. He is survived by the widow and one son.

Latest Portland-Cement Statistics

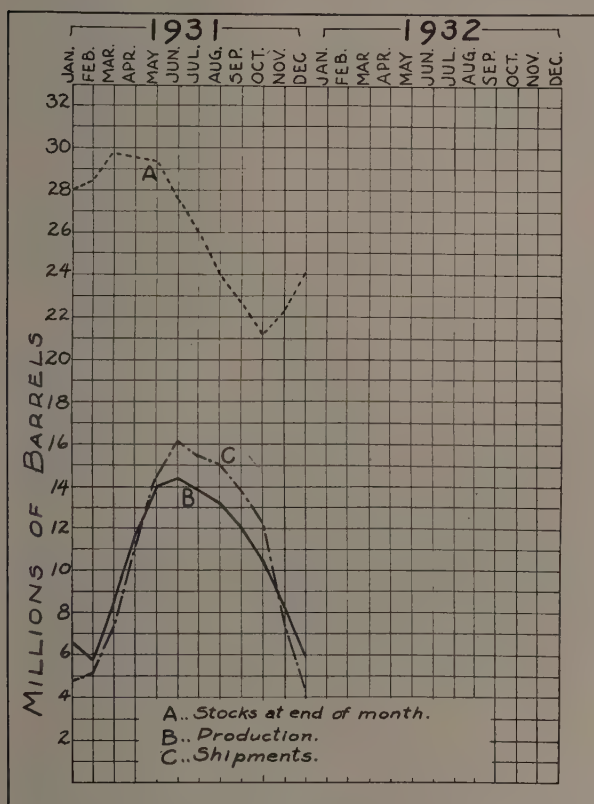


Chart showing production, shipments and stocks on hand, by months, from January, 1931, to December, 1931.

THE Portland-cement industry in December, 1931, produced 5,998,000 bbl., shipped 4,142,000 bbl. from the mills, and had in stock at the end of the month 24,075,000 bbl. Production of Portland cement in December, 1931, showed a decrease of 29.3 per cent. and shipments a decrease of 27.2 per cent. as compared with December, 1930. Stocks at the mills were 6.8 per cent. lower than a year ago.

The preliminary totals for 1931 show decreases of 22.7 per cent. in production and 20.5 per cent. in shipments from the final totals for 1930. Shipments from mills in 1931 amounted to 126,465,000 bbl. with an estimated factory value of \$139,381,000. The statistics here presented are compiled from reports for December, received by the Bureau of Mines, from all manufacturing plants except three, for which estimates have been included in lieu of actual returns.

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN NOVEMBER, 1931

Imported from—	District into which imported	Barrels	Value
Belgium.....	Porto Rico.....	2,127	\$ 1,829
Canada.....	Maine and New Hampshire.....	9	33
Cuba.....	Porto Rico.....	604	900
Denmark.....	Porto Rico.....	2,504	2,250
Japan.....	Hawaii.....	1,696	1,546
United Kingdom.....	New York.....	21,000	15,677
		27,940	22,235

DISTRIBUTION OF CEMENT

Shipped to—	October		November	
	1930	1931	1930	1931
Alabama.....	88,358	50,940	67,219	26,734
Alaska.....	697	808	158	1,639
Arizona.....	33,524	27,780	31,593	17,011
Arkansas.....	144,307	40,635	89,411	34,693
California.....	931,721	580,258	665,028	470,754
Colorado.....	78,683	86,048	41,748	38,404
Connecticut.....	153,822	162,540	113,957	115,800
Delaware.....	20,017	27,187	17,889	18,229
District of Columbia.....	154,670	122,498	84,931	95,710
Florida.....	89,354	51,252	74,271	37,769
Georgia.....	174,340	162,410	103,952	128,392
Hawaii.....	23,850	21,468	17,979	21,519
Idaho.....	34,385	15,481	13,538	9,077
Illinois.....	1,586,016	856,580	655,302	406,836
Indiana.....	321,285	313,589	160,458	138,043
Iowa.....	317,288	209,676	98,047	75,393
Kansas.....	226,472	166,235	153,458	85,981
Kentucky.....	223,805	149,282	102,299	90,891
Louisiana.....	172,194	485,188	133,845	260,677
Maine.....	87,454	46,894	53,127	24,292
Maryland.....	257,617	291,938	119,436	198,975
Massachusetts.....	376,533	344,866	248,481	230,690
Michigan.....	867,458	461,985	407,866	191,760
Minnesota.....	237,592	242,908	89,729	91,214
Mississippi.....	39,377	23,656	34,044	15,557
Missouri.....	713,573	481,965	413,025	213,618
Montana.....	27,189	21,927	20,597	9,559
Nebraska.....	174,005	194,514	68,717	51,826
Nevada.....	18,751	18,440	6,681	14,780
New Hampshire.....	48,117	51,874	24,958	30,307
New Jersey.....	664,381	645,068	403,664	398,550
New Mexico.....	27,047	25,380	17,445	11,949
New York.....	2,063,858	2,096,119	1,233,534	1,227,819
North Carolina.....	101,403	59,103	63,911	55,078
North Dakota.....	24,513	17,110	7,734	6,173
Ohio.....	1,011,292	749,570	614,013	372,879
Oklahoma.....	270,430	174,121	195,644	124,304
Oregon.....	130,953	91,480	87,098	52,811
Pennsylvania.....	1,351,511	781,503	517,568	528,285
Porto Rico.....	5,000	4,515	125	9,270
Rhode Island.....	76,031	54,139	34,865	35,781
South Carolina.....	273,208	243,408	177,632	166,201
South Dakota.....	44,410	29,736	17,948	14,229
Tennessee.....	271,922	111,024	117,871	95,367
Texas.....	438,457	542,920	454,199	369,500
Utah.....	38,549	22,669	21,142	12,905
Vermont.....	53,087	32,942	21,939	15,769
Virginia.....	155,410	122,618	102,029	117,236
Washington.....	324,276	157,064	262,159	71,393
West Virginia.....	139,483	142,876	105,304	83,551
Wisconsin.....	414,797	389,339	157,633	153,691
Wyoming.....	20,691	10,638	8,763	4,908
Unspecified.....	40,039	121,253	13,633	53,609
Foreign countries.....	15,563,202	12,335,427	8,747,597	7,127,388
	35,798	24,573	36,403	28,612
Total shipped from cement plants.....	15,599,000	12,360,000	8,784,000	7,156,000

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN NOVEMBER, 1931

Exported to—	Barrels	Value
Canada.....	1,370	\$ 5,031
Central America.....	14,728	37,645
Cuba.....	2,400	4,359
Other West Indies and Bermuda.....	817	1,450
Mexico.....	3,420	10,738
South America.....	9,259	32,483
Other countries.....	1,206	6,090
	33,200	97,796

RELATION OF PRODUCTION TO CAPACITY

	December		November 1931 (per cent.)	October 1931 (per cent.)	September 1931 (per cent.)
	1930 (per cent.)	1931 (per cent.)			
The month.....	38.2	26.4	37.2	47.4	55.3
The 12 months ended.....	61.5	46.5	44.4	48.6	50.2

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1930 AND 1931 (thousands of barrels)

Month	Production		Shipments		Stocks at End of Month	
	1930	1931	1930	1931	1930	1931
January.....	8,498	6,595	4,955	4,692	27,081	27,759
February.....	8,162	5,920	7,012	5,074	28,249	28,612
March.....	11,225	8,245	8,826	7,192	30,648	29,676
April.....	13,521	11,245	13,340	11,184	30,867	29,715
May.....	17,249	14,010	17,224	14,200	30,891	29,554
June.....	17,239	14,118	18,781	16,077	29,364	27,602
July.....	17,078	13,899	20,153	15,545	26,289	25,934
August.....	17,821	13,549	20,299	15,172	23,824	24,313
September.....	16,124	12,092	18,083	13,671	21,889	22,736
October.....	14,410	10,762	15,599	12,360	20,697	21,218
November.....	11,098	8,161	8,784	7,156	23,056	22,219
December.....	8,480	5,998	5,688	4,142	25,838	24,075
Totals.....	160,905	124,594	158,744	126,465		

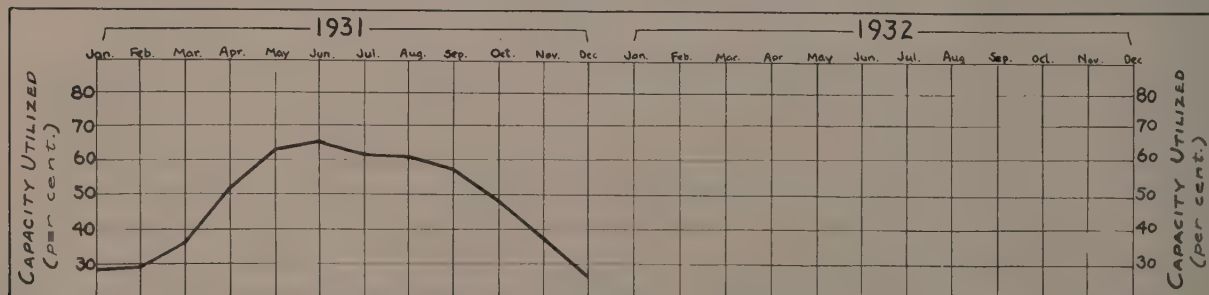
District	PRODUCTION AND STOCKS OF CLINKER, BY DISTRICTS, IN DECEMBER, 1930 and 1931 (thousands of barrels)				PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN DECEMBER, 1930 and 1931, AND STOCKS IN NOVEMBER 1931 (thousands of barrels)							
	Production		Stocks at end of Month		December							
					Production		Shipments		Stocks at End of Month			
	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	Stocks at End of November 1931	
Eastern Pa., N. J., and Md.....	2,052	1,622	1,045	799	1,939	1,434	1,469	1,310	5,036	4,774	4,649	
New York and Maine.....	817	585	659	406	716	458	364	321	1,774	1,321	1,185	
Ohio, Western Pa., and W. Va.....	992	490	1,064	769	922	422	467	282	3,587	3,450	3,310	
Michigan.....	680	314	871	641	614	197	245	153	3,096	2,054	2,011	
Wis., Ill., Ind., and Ky.....	1,109	735	887	495	984	707	394	375	3,604	2,817	2,485	
Va., Tenn., Ala., Ga., Fla., and La.....	745	653	1,028	671	680	596	648	432	1,795	1,821	1,656	
Eastern Mo., Ia., Minn., and S. Dak.....	950	621	530	471	906	600	337	212	2,403	3,098	2,710	
W. Mo., Neb., Kan., Okla., and Ark.....	807	725	556	537	700	688	367	372	2,089	1,626	1,311	
Texas.....	393	339	338	341	392	291	362	214	802	726	649	
Colo., Mont., Utah, Wyo., and Idaho.....	0	98	271	128	34	59	46	43	353	501	485	
California.....	607	589	1,140	1,411	531	474	755	370	763	1,218	1,114	
Oreg. and Wash.....	322	79	420	412	215	72	234	58	536	669	655	
Totals.....	9,484	6,840	8,809	7,081	8,480	5,998	5,688	4,142	25,838	24,075	22,219	

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1930 AND 1931

Month	Exports				Imports			
	1930		1931		1930		1931	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January.....	82,387	\$293,135	41,199	\$115,678	201,609	\$207,461	97,057	\$132,937
February.....	84,267	217,798	25,703	88,989	114,455	119,717	22,370	26,250
March.....	117,563	357,896	54,599	144,579	43,622	59,981	70,532	80,686
April.....	57,419	200,217	40,478	116,564	140,871	178,226	54,717	61,728
May.....	57,423	198,170	48,028	140,953	94,696	111,998	20,061	22,794
June.....	82,077	223,639	43,619	107,977	55,356	74,370	32,080	42,955
July.....	47,082	166,577	29,494	97,995	12,404	20,973	17,445	22,349
August.....	49,031	167,579	39,517	106,643	35,323	39,029	9,760	13,404
September.....	46,664	153,384	27,543	81,399	51,096	59,721	33,575	33,520
October.....	62,690	190,305	24,531	68,524	75,284	84,364	39,642	43,380
November.....	50,495	151,555	33,200	97,796	109,124	125,448	27,940	22,235
December.....	38,680	134,260			44,157	59,641		
Totals.....	755,778	\$2,454,515			977,997	\$1,140,929		

PRODUCTION AND STOCKS OF CLINKER BY MONTHS, IN 1930 AND 1931 (thousands of barrels)

Month	Production		Stocks End of Month		Month	Production		Stocks End of Month	
	1930	1931	1930	1931		1930	1931	1930	1931
January.....	10,504	8,129	9,646	10,384	July.....	15,069	12,246	11,684	10,209
February.....	10,008	7,473	11,572	11,946	August.....	15,244	11,664	9,275	8,468
March.....	13,045	9,586	13,503	13,318	September.....	14,577	10,414	7,783	6,918
April.....	15,025	11,540	15,164	13,854	October.....	13,895	9,825	7,266	6,021
May.....	16,607	13,159	14,668	13,087	November.....	11,639	8,259	7,758	6,215
June.....	15,895	12,679	13,452	11,837	December.....	9,484	6,840	8,809	7,081



Production capacity utilized by months, January, 1931, to December, 1931.

SUMMARY OF MONTHLY ESTIMATES OF PRODUCTION AND SHIPMENTS OF FINISHED PORTLAND CEMENT WITH ESTIMATED VALUE OF SHIPMENTS IN 1931, BY DISTRICTS

(Quantities in thousands of barrels)

District	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1931	1930	
<i>Production</i>															
Eastern Pa., N. J. and Md.	1,617	1,630	2,293	2,691	3,053	2,900	2,675	2,891	2,761	2,369	2,046	1,434	28,360	35,141	
New York and Maine	420	151	437	832	1,106	1,230	1,192	1,375	1,292	1,110	686	458	10,289	11,342	
Ohio, Western Pa. and W. Va.	504	412	444	829	1,289	1,505	1,520	1,296	1,063	904	769	422	10,957	17,620	
Michigan	45	109	72	524	722	919	983	832	743	602	385	197	6,133	11,511	
Wis., Ill., Ind. and Ky.	804	427	797	1,231	1,913	1,757	1,877	1,818	1,623	1,337	894	707	15,185	20,233	
Va., Tenn., Ala., Ga., Fla. and La.	646	836	942	1,268	1,418	1,312	1,319	1,193	1,069	1,009	733	596	12,341	12,881	
Eastern Mo., Ia., Minn. and S. Dak.	854	766	869	1,261	1,335	1,300	1,414	1,449	1,228	975	827	600	12,878	16,694	
Western Mo., Neb., Kans., Okla. and Ark.	450	263	638	674	1,248	1,187	1,015	987	701	795	566	688	9,212	12,510	
Texas	322	286	489	585	600	634	646	644	625	601	459	291	6,182	6,781	
Colo., Mont., Utah, Wyo. and Idaho	123	160	192	233	296	298	219	209	171	117	97	59	2,174	2,269	
California	624	709	830	793	703	745	670	552	529	698	555	474	7,882	10,124	
Oreg. and Wash.	186	171	242	324	327	331	369	303	287	245	144	72	3,001	4,091	
	6,595	5,920	8,245	11,245	14,010	14,118	13,899	13,549	12,092	10,762	8,161	5,998	124,594	161,197	
															Estimated Value of Shipments, 1931
<i>Shipments</i>															
Eastern Pa., N. J. and Md.	1,084	1,123	1,724	2,587	2,952	3,260	3,114	3,147	3,108	3,123	2,064	1,310	28,596	35,357	\$ 29,725,000
New York and Maine	206	182	381	769	1,137	1,360	1,436	1,556	1,500	1,231	661	321	10,740	11,122	11,939,000
Ohio, Western Pa. and W. Va.	367	415	595	919	1,252	1,507	1,471	1,353	1,224	1,139	581	282	11,105	17,068	10,823,000
Michigan	220	219	286	529	825	1,030	1,147	1,065	807	616	267	153	7,164	10,818	7,461,000
Wis., Ill., Ind. and Ky.	354	416	526	1,260	1,743	2,220	2,275	2,316	1,995	1,662	761	375	15,903	19,572	14,599,000
Va., Tenn., Ala., Ga., Fla. and La.	679	768	1,061	1,343	1,428	1,463	1,210	1,082	1,032	1,050	763	432	12,311	12,729	15,310,000
Eastern Mo., Ia., Minn. and So. Dak.	288	377	494	1,029	1,538	1,917	1,896	1,737	1,341	995	474	212	12,298	16,886	11,941,000
Western Mo., Neb., Kans., Okla. and Ark.	321	404	520	942	1,307	1,303	1,102	1,121	886	881	475	372	9,634	11,880	9,430,000
Texas	340	328	456	581	644	693	696	667	688	583	378	214	6,268	6,792	8,868,000
Colo., Mont., Utah, Wyo. and Idaho	50	82	126	184	298	278	229	232	224	185	85	43	2,016	2,375	3,374,000
California	643	602	770	733	710	737	624	595	593	662	527	370	7,566	10,439	11,357,000
Oreg. and Wash.	140	158	253	308	366	309	345	301	273	233	120	58	2,864	4,021	4,554,000
	4,692	5,074	7,192	11,184	14,200	16,077	15,545	15,172	13,671	12,360	7,156	4,142	126,465	159,059	\$139,381,000

SUMMARY OF MONTHLY ESTIMATES OF CLINKER PRODUCED AND IN STOCK AT MILLS IN THE UNITED STATES IN 1931, BY DISTRICTS

(Thousands of barrels)

District	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1931	1930
<i>Production</i>														
Eastern Pa., N. J. and Md.	1,878	1,947	2,489	2,699	3,004	2,660	2,537	2,514	2,417	2,089	1,922	1,622	27,778	34,318
New York and Maine	659	326	669	979	1,028	1,021	1,047	1,019	987	992	750	585	10,062	11,237
Ohio, Western Pa. and W. Va.	724	580	623	897	1,188	1,271	1,339	1,123	822	741	747	480	10,535	17,443
Michigan	445	380	382	486	577	623	610	587	464	615	338	314	5,821	11,678
Wis., Ill., Ind. and Ky.	1,000	891	980	1,419	1,685	1,533	1,574	1,479	1,276	1,140	1,047	735	14,759	20,405
Va., Tenn., Ala., Ga., Fla. and La.	587	749	962	1,238	1,283	1,274	1,281	1,218	1,078	877	746	653	11,946	13,188
Eastern Mo., Ia., Minn. and So. Dak.	898	896	1,137	1,256	1,318	1,145	1,159	1,302	1,168	924	798	621	12,622	16,536
W. Mo., Neb., Kans., Okla. and Ark.	550	388	716	648	1,125	1,143	935	817	691	814	578	725	9,130	12,872
Texas	315	292	430	565	496	702	675	633	576	583	479	339	6,085	6,548
Colo., Mont., Utah, Wyo. and Idaho	128	160	203	234	426	297	212	181	109	59	58	98	2,051	2,284
California	686	706	813	835	800	754	588	503	502	686	609	589	8,071	10,519
Oregon and Washington	259	158	182	284	343	256	289	288	324	305	187	79	2,954	3,964
	8,129	7,473	9,586	11,540	13,159	12,679	12,246	11,664	10,414	9,825	8,259	6,840	121,814	160,992
<i>Stocks at end of month</i>														
Eastern Pa., N. J. and Md.	1,329	1,665	1,893	1,934	1,923	1,731	1,593	1,237	936	688	601	799		
New York and Maine	1,902	1,078	1,314	1,470	1,433	1,212	940	600	315	209	276	406		
Ohio, Western Pa. and W. Va.	1,290	1,464	1,645	1,710	1,634	1,402	1,262	1,100	868	702	708	769		
Michigan	1,271	1,542	1,852	1,820	1,679	1,415	1,049	823	555	571	524	641		
Wis., Ill., Ind. and Ky.	1,091	1,558	1,741	1,928	1,706	1,490	1,199	871	532	311	464	495		
Va., Tenn., Ala., Ga., Fla. and La.	966	872	897	865	737	709	685	715	720	597	611	671		
Eastern Mo., Iowa, Minn. and So. Dak.	584	727	1,006	1,021	1,027	930	710	587	545	478	462	471		
W. Mo., Neb., Kans., Okla. and Ark.	666	791	871	848	732	695	622	461	456	479	495	537		
Texas	339	348	300	288	193	270	310	310	274	266	289	341		
Colo., Mont., Utah, Wyo. and Idaho	276	276	287	286	280	280	285	258	187	127	88	128		
California	1,175	1,141	1,085	1,294	1,362	1,364	1,290	1,252	1,230	1,235	1,292	1,411		
Oregon and Washington	495	484	427	390	411	339	264	254	300	358	405	412		
	10,384	11,946	13,318	13,854	13,087	11,837	10,209	8,468	6,918	6,021	6,215	7,081		

SUMMARY OF ESTIMATES OF STOCKS OF FINISHED PORTLAND CEMENT AT END OF EACH MONTH IN 1931, BY DISTRICTS

(Thousands of barrels)

District	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Eastern Pa., N. J. and Md.	5,546	6,054	6,622	6,725	6,824	6,465	6,026	5,769	5,422	4,668	4,649	4,774
New York and Maine	1,988	1,957	2,013	2,076	2,044	1,914	1,669	1,489	1,159	1,159	1,185	1,321
Ohio, Western Pa. and W. Va.	3,709	3,705	3,565	3,476	3,513	3,511	3,559	3,505	3,344	3,122	3,310	3,450
Michigan	2,915	2,814	2,600	2,586	2,482	2,372	2,208	1,975	1,908	1,893	2,011	2,054
Wis., Ill., Ind. and Ky.	3,955	3,966	4,237	4,208	4,378	3,915	3,518	3,020	2,648	2,352	2,485	2,817
Va., Tenn., Ala., Ga., Fla. and La.	1,766	1,833	1,714	1,639	1,630	1,479	1,576	1,687	1,725	1,684	1,656	1,821
Eastern Mo., Ia., Minn. and S. Dak.	3,069	3,458	3,833	4,064	3,862	3,244	2,762	2,474	2,361	2,372	2,710	3,098
W. Mo., Neb., Kans., Okla. and Ark.	2,218	2,077	2,196	1,885	1,826	1,710	1,624	1,490	1,305	1,219	1,311	1,626
Texas	782	740	773	777	734	675	626	603	539	558	619	726
Colo., Mont., Utah, Wyo. and Idaho	410	486	552	600	609	629	609	585	541	474	485	501
California	831	938	998	1,110	1,103	1,113	1,158	1,114	1,050	1,086	1,111	1,218
Oreg. and Wash.	570	584	573	569	549	575	599	602	612	631	654	669
	27,759	28,612	29,676	29,715	29,554	27,602	25,934	24,313	22,736	21,218	22,219	24,075

Traffic News and Comment

Recent I. C. C. Decisions

Weighing Cars.—The Commission has found the charges collected for light-weighting cars at McKees Rocks, Pa., unreasonable, and has awarded reparation. It found that any charge for light-weighting complainant's cars when the stenciled tare weight differed, differs, or may differ from the actual tare be more than 500 pounds, was and would be unreasonable. The report stated that it expected the defendant to amend the tariff accordingly. I. C. C. Docket No. 24,271, Federal Enameling and Stamping Co., v. P. C. & Y.

Mica.—Reparation has been awarded on finding that the rates on crude, waste or scrap mica from Portland, Conn., Keene, Cardigan, Bristol and Rumney, N. H., to Richmond, Va., unreasonable to the extent they exceeded or may exceed 22.5 per cent. of the corresponding first class rates prescribed in the Eastern Class Rate Investigation, 164 I. C. C. 314, 171 I. C. C. 481, and 177 I. C. C. 156, c.l. min. wt. 60,000 lbs. New rates are to be established not later than April 18th. I. C. C. Docket No. 24,192, Richmond Mica Corp., v. B. & O. et al.

Examiners' Reports

Empty Cement Sacks.—Examiner Leland F. James proposes that the Commission find the rate on empty returned cement sacks from Minneapolis, Minn., to Davenport, Ia., applicable and not unreasonable but that the weight applied was excessive to the extent of 1,769 lb. He proposes reparation amounting to \$10.79. I. C. C. Docket No. 24,727, Dewey Portland Cement Co., v. C. R. I. & P.

Talc.—Examiner C. Garofalo recommends reparation on finding that the rate on talc from points in New York to Sheldon Springs, Vt., is unreasonable to the extent it exceeded or may exceed 19 c. I. C. C. Docket No. 24,435, Missisquoi Pulp & Paper Co. et al., v. N. Y. C. et al. (PIT AND QUARRY, July 1, 1931, p. 80.)

Fourth-Section Applications

Ground Limestone.—Agent B. T. Jones, has requested fourth-section relief in connection with the establishment of rates on ground pulverized or agricultural limestone from Waukesha, Wis., to points in Michigan and to Michigan City, Ind. F. S. A. No. 14,620.

New Complaints Filed

Cement.—Schedules in Supplement No. 39 to Glenn's I. C. C. No. A-718, proposing to increase rates on cement from southern points to destinations on the Valley Railroad in Virginia have been suspended by the Commis-

sion from January 15, until August 15. I. & S. Docket No. 3,689.

Complainant has alleged rates on cement from Portland, Colo., to destinations in Kansas, New Mexico and adjacent states are in violation of sections 1 and 3 and that producers in Missouri, Kansas and Texas are preferred and asks that new rates be prescribed in I. C. C. Docket No. 24,928, The Colorado Portland Cement Co., Portland, Colo., v. A. T. & S. F. et al.

Rates on cement in violation of sections 1, 3 and 6, from Bay Bridge, O., to Wisconsin points have been alleged, with shippers at Buffington, Ind., Newaygo and Lamson, Mich., preferred, and reparation has been sought in I. C. C. Docket No. 24,949, Medusa Portland Cement Co., Cleveland, O., v. A. & W. et al.

Lime.—Unreasonable rates, ratings and charges on lime from Denie, Ala., to points in Arkansas, Louisiana and Texas are alleged and new rates and reparation sought in I. C. C. Docket No. 24,945, Muscle Shoals White Lime Co., Sheffield, Ala., v. A. G. S. et al.

Sand.—Unreasonable rates on crude sand with 2 per cent. bituminous content from Big Clifty, Ky., to Ironton, O., and Milwaukee, Wis., are alleged and reparation is sought in I. C. C. Docket No. 24,936, The O. A. Smith Agency, Inc., v. I. C. et al.

Rate-Committee Dockets

Trunk Line Assn.

Cement.—Shippers propose that provision for the allowance of the weight of the paper lining used in the lining of cars for the safe transportation of cement be made by adding exceptions to Rule 30 of the Official Classification, as follows: "Cement, in carloads, paper lining for: When paper car linings are furnished by shippers for the safe transportation of shipments of cement, common, hydraulic, natural or portland, in carloads, no freight charges will be assessed for the weight of such paper car linings, provided that in no case will less than the prescribed minimum weight be charged for," for application from all points in Trunk Line territory. Docket No. M-1,944.

Carriers propose to establish a rate of 19½ c. on cement, c.l. min. wt. 50,000 lb., to New Berlin, N. Y., from Bessemer-Kenney Yard and West Winfield, Pa., and a rate of 20 c. per 100 lb., from Wampum-Crescentdale, New Castle, Walford and Neville Island, Pa. Docket No. 28,064, Sup. 2.

Feldspar.—Shippers propose the establishment of rates on feldspar, c.l. min. wt. 60,000 lb., from Brookneal, Va., to Birmingham, N. J., \$5.10 and to Carteret, N. J., \$4.60 per net ton. Docket No. 28,439.

Sand.—To meet motor truck competition carriers propose to reduce the rate on common sand and gravel¹, from Point Marion, Pa., to Uniontown, Pa., from 70 c. to 60 c. a net ton. Docket No. 28,463.

Slag.—Carriers propose to publish rates on slag¹, from Bethlehem, Pa., to Cresco and Mountain Home, Pa., of \$1.10 and Mt. Pocono, Pocono Summit, Tobyhanna and Gouldsboro, Pa., of \$1.20 per net ton. Docket No. 28,353, Sup. 1.

Sulphur.—To meet motor-truck competition carriers propose to reduce the rate on sulphur, c. l. min. wt. 100,000 lb., from Warners, N. J., to Bound Brook, N. J., from \$1.50 to 70c. per net ton. Docket No. 28,405.

Central Freight Assn.

Amiesite.—It is proposed to establish a commodity rate of \$4.40 a net ton on amiesite from Youngstown, O., to Fredericksburg, Va. Docket No. 30,245.

Agricultural Limestone.—Carriers propose to revise the rates on agricultural limestone in open-top cars¹, from Chicago, Ill., and points taking same rates as shown on page 5, C. F. A. Tariff 197-N, to various destinations in Indiana to the same basis as now in effect on crushed stone, gravel and sand. Docket No. 30,350.

Crushed Stone.—Carriers propose to reduce the rate on crushed stone and related articles from Marion, O., to Broadway, Claiborne, Coddington, Greencamp, Richwood and Woodland, O., from 60 c. to 50 c. a net ton. Docket No. 30,212.

Dolomite.—Carriers propose to revise commodity description in agency and/or individual lines' tariffs publishing rates on crude or raw dolomite and fluxing stone, between points in C. F. A. territory, described in C. F. A. Tariff 130-T, also from points in C. F. A. territory to points east of the Western Termini of Eastern Trunk Lines, to read as follows: "Stone, dolomite or fluxing, furnace or foundry, raw or crude (unburnt)." Said rates to be restricted to apply only on shipments when loaded in open-top cars. When shipments are loaded in box cars, the rates to be on the basis of 13 per cent. of the first class rate or Column 13 rate, to all points where rates are now published on the above commodities, except that on intrastate traffic in Ohio the rates prescribed by the Ohio Commission in Docket 2,327, on agricultural limestone are to be held as maximum. This cancels Docket No. 29,997. (PIT AND QUARRY, Jan. 13, 1932). Docket No. 30,253.

Fluxing Stone.—Carriers propose to reduce the rate on furnace and foundry limestone, c.l. min. wt. marked capacity of car, from Hillsville and Walford, Pa., to Canton and Massillon, O., from \$1.13 to 90 c. per

gross ton, to expire six months from the effective date. Docket No. 30,301.

Lime.—Shippers at Mitchell, Ind., propose reductions in the rates on lime, in bulk, c.l. min. wt. 50,000 lb., as shown below. The present rates apply on a minimum weight of 30,000 lb. Docket No. 30,344.

To	Proposed	Present
Middletown, O.	10½	13
Lima, O.	12	15
Ecorse, Mich.	14	18
Detroit, Mich.	14	18
Filer City, Mich.	15½	19½
Kalamazoo, Mich.	13	16½
Kokomo, Ind.	10½	14

Quartzite.—Carriers propose to reduce the rate on quartzite, c.l. min. wt. marked capacity of car, from Nelles Corners, Ont., to Suspension Bridge, N. Y., from 15½ c. to 6½ c. Docket No. 30,236.

Molding Sand.—Shippers at Eau Claire, Mich., propose revisions in the rates on molding sand as shown below. Docket No. 30,211.

To	Proposed	Present
Auburn, Ind.	\$1.39	\$3.00
Kokomo, Ind.	1.09	3.00
Peru, Ind.	1.09	4.00
Richmond, Ind.	1.09	4.20
Cadillac, Mich.	2.27	3.00
Coldwater, Mich.	1.26	3.20
Muskegon, Mich.	1.64	3.20
Owosso, Mich.	1.89	3.60
Port Huron, Mich.	2.14	4.40
Saginaw, Mich.	1.69	4.00
Holland, Mich.	1.26	2.80

Sand and Gravel.—Reductions in the rates on sand and gravel to points in West Virginia and Kentucky from southern Ohio shipping points are proposed by carriers. Representative rates proposed to Andressan, W. Va., are, from Portsmouth, Sciotoville and Sargents, \$1.40; Ironton, \$1.30; Chillicothe, \$1.60; to Lexington, Ky., from Portsmouth and Sciotoville, \$1.50; Sargents, \$1.60; Ironton, \$1.40; and Chillicothe, \$1.70. A complete exhibit will be furnished on request. Docket No. 30,226.

A reduction in the rate on sand (all kinds) and gravel, in open-top cars, from Akron, O., to Cleveland, O., from 70 c. to 60 c. per net ton is proposed by shippers. Docket No. 30,261.

Western Trunk Line Committee

Crushed Stone, Sand and Gravel.—At present the c.l. min. wt. on crushed stone, sand and gravel between stations in Nebraska is 90 per cent. of the marked capacity of the car, except that when weight of shipment loaded to full visible capacity of car is less than 90 per cent. of marked capacity of car, the actual weight will apply. In no case shall the c.l. min. wt. be less than 40,000 lb. It is proposed to establish the following rule: "When carrier cannot furnish car of weight carrying capacity of dimensions ordered by shipper, and for its own convenience provides a car of greater weight carrying capacity or dimensions than the one ordered by shipper, it may be used on the basis of the minimum carload weight fixed in tariff to apply on class of car ordered by shippers, but in no case less than actual weight; the weight carrying capacity or dimensions of the car

ordered, number of the order and the date of same to be shown in each instance on the bill of lading and the carrier's way-bill. But if through oversight this information is not shown on bills of lading and way-bills, this rule will apply provided shipper can furnish satisfactory evidence that car of size claimed was actually ordered. In no case shall shipment be billed on basis of minimum weight for car of less length than owned, leased or regularly in use on the initial line. Under above rules orders will not be accepted for cars of less weight carrying capacity than prescribed by minimum weights governing rates." This rule is proposed by shippers. Docket No. 6,146-L.

Fluorspar.—Shippers propose reductions in the rates on fluorspar, c.l. min. wt. 50,000 lb., from Colorado common points as described in W.T.L. Tariff 111-G, also Canon City, Echo, Feldspar and Spikebuck, Colo., as shown below. Rates per net ton. Docket No. 5,717-A.

To	Present	Proposed
Group 1, Mississippi River..	\$5.90	\$4.60
Group 2, Peoria	6.80	5.60
Group 3, Chicago	7.60	5.60
Group 4, Missouri River.....	5.90	4.60

Southwestern Freight Bureau

Cement.—It is proposed to establish I.C.C. Docket No. 8,182 Scale 2 rates on cement, c.l. min. wt. 50,000 lb., from Paducah, Ky., to points in Missouri to which Scale 2 rates apply from points in the Kansas Gas Belt, Linwood, Ia., and Missouri producing points such as Ilasco, Prospect Hill, Alpha, Marquette and Sugar Creek, and to establish Scale 3 rates to points in Missouri to which Scale 3 rates apply from the points referred to above. Proponent shipper contemplates establishing a loading plant at Paducah, Ky., and has requested that the above basis be established. Docket No. 24,087.

Transcontinental Freight Bureau

Borate Rock and Borax.—Shippers request the restoration of the relationship between rates on borate rock and borax, Item 1,012, Tariff 3-D, which relationship has been disrupted, because of increases allowed in Ex Parte 103, viz. 6 c. per ton on borate rock and 40 c. per ton on borax. Docket No. 13,253.

Talc.—It is proposed to establish a rate on crude talc, c.l. min. wt. 60,000 lb., eastbound, of 75 c. per 100 lb., from rate basis 1 points to Group C, in Tariff 3-D. Docket No. 13,276.

¹ The c.l. min. wt. will be 90 per cent. of the marked capacity of the car, except when car is loaded to full cubical or visible capacity, actual weight will apply.

Questions and Answers

Traffic Editor: About a year ago a rate from our shipping point to a destination in another state was increased. As we were not shipping to that point at that time we did not ask the Interstate Commerce Commission

to suspend the increased rates. We understand that in suspension proceedings it is up to the railroads to justify the increased rate. Since we did not ask for suspension does the burden of the proof of the reasonableness or unreasonableness of the rate rest with us or the railroads?—H. C. R.

* * *

[The law in this case is found in paragraph 7 of section 15 of the Interstate Commerce Act, which reads in part, "At any hearing involving a rate, fare, or charge increased after January 1, 1910, or of a rate, fare, or charge sought to be increased after the passage of this Act, the burden of proof to show that the increased rate, fare, or charge or proposed increased rate, fare, or charge, is just and reasonable shall be upon the carrier." In the case of Virginia-Carolina Chemical Co. v. A. C. L., 27 I. C. C. 234-236, a rate was increased on Feb. 26, 1912, and complaint was filed April 12, 1912. This was not a suspension case but the Commission said, "As the advances in question were made after January 10, 1910, the burden of proof to show that the increased rates are just and reasonable rests with the defendant (the carrier)".—Editor.]

Find Bauxite in Quality Ideal for Refractories

A prime requirement of bauxite for use in the refractory industry (as opposed to the manufacture of aluminum or of fused-alumina cement) is that it shall be as free as possible of iron oxide and silica, which act to reduce the melting point of the mixture. As a sequel to a previous article by the writer, he received word from an American company that it had discovered a deposit of bauxite in north-eastern South America (Dutch Guiana) that is practically free from these objectionable minerals. As the author was somewhat skeptical he obtained some samples of this bauxite, and his own analyses, confirmed by those of a commercial laboratory, show that it contains (in fired state) between 1 and 2 per cent. of iron oxide, not much more silica, and traces of alkali; the Al₂O₃ content is approximately 89 per cent. This material is thus excellently suited to the manufacture of refractory products, although of course there are still problems of obtaining it abundantly and cheaply.

For use as refractories, bauxite bricks should not be exposed to too great bearing loads. Bauxite lining for furnaces and kilns should only be load-bearing at certain exposed parts, and there only when high-basic material is used. To avoid danger of shrinkage, bauxite should be thoroughly burned, and when made into bricks should be mixed in the proportion to the binder (90 parts to 10).—Dr. Hans Jordt in *Tonindustrie-Zeitung*, 55:1377, Dec. 10, 1931.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, for which no responsibility in any way is to attach to this magazine or to any of its staff.

Riverside Cement Orders Preferred Dividend Paid

Profits of Riverside Cement Co. of Los Angeles, Cal., for the year 1931, after provision for depreciation, depletion and Federal income tax, were \$401,372.35, as compared with the dividend requirement upon the first preferred stock of \$345,774.

The 1931 provision for depreciation and depletion was in keeping with the established policy of the company and amounted to \$352,085.37. During 1931 dividends of \$345,774 were paid on the preferred. Dividends of \$36,000 were paid on the class A stock. During the year the company retired 1463 shares of its preferred stock, leaving outstanding 59,547 shares. Of this the company has purchased for future retirement 3,889 shares. The original issue of preferred was 65,000 shares.

The company's present ratio of total current assets to total current liabilities is approximately 13 to 1. The ratio of cash to total current liabilities is over 5 to 1.

Arundel Corp. Net \$4.08 a Share; \$4.39 in 1930

Report of Arundel Corp., sand and gravel producers of Baltimore, Md., for the year ended December 31, 1931, shows net profit of \$2,012,479 after depreciation, depletion, taxes, loss on abandonment and reconstruction of fixed assets, etc., equal to \$4.08 a share on 492,556 no-par shares of capital stock. Loss on notes of the Everglades Drainage District and other receivables amounting to \$1,980,241 was charged to surplus account during the year. In 1930 net profit was \$2,163,694, equal to \$4.39 a share.

Balance sheet of the corporation as of December 31, 1931, shows total assets of \$9,740,083 compared with \$11,070,991 at end of 1930, and surplus

\$3,544,719 against \$5,074,725. Current assets were \$3,833,674 and current liabilities \$1,114,431 as contrasted with \$3,735,792 and \$883,873 respectively, at the close of the preceding year.

At the annual stockholders' meeting held recently retiring directors were reelected. One vacancy on the board was not filled.

Canada Cement Earnings Nearly Equal Year Ago

Canada Cement Co., Ltd., of Montreal, reports for the year ended November 30, 1931, net income of \$1,553,191 after interest, depreciation, taxes, reserve for contingencies and preferred stock sinking fund, equal after dividend requirements on 6½ per cent. preferred stock, to 32c a share on 600,000 no-par shares of common stock. This compares with \$1,566,014, or 34c a common share in preceding fiscal year.

The company is the largest Canadian producer, operating eight plants at Exshaw, Alta.; Fort Whyte, Man.; Steep Rock, Man.; Belleville, Ont.; Lakefield, Ont.; Port Colborne, Ont.; Hull, Que., and Montreal East, Que.

Uvalde Asphalt Co. Will Develop Kaolin Deposit

The Uvalde Asphalt Co. has taken over for development purposes the large deposit of kaolin situated seven miles west of Leakey, Tex. It will make an initial shipment of two carloads of the clay to an eastern pottery manufacturing plant as soon as it can be mined and hauled to the shipping point at Leakey. This kaolin deposit has attracted the attention of manufacturers of fine pottery for many years, but on account of its inaccessibility to railroad transportation it has remained dormant.

Indiana Limestone Co. Obligations Decreased

Consolidated income account of Indiana Limestone Co. for the year ended November 30, 1931, compares as follows:

	1931	1930
Net sales	\$4,618,402	\$10,351,643
Costs and exp.	5,402,483	8,675,776
Oper. loss	\$784,081	*\$1,675,867
Other inc.	40,963	82,441
Loss	\$743,118	*\$1,758,308
Depr. and depl.	500,424	589,939
Interest	1,122,242	1,149,142
Fed. taxes.		4,000
Net loss.	\$2,365,784	*\$15,227
*Profit.		

Consolidated balance sheet as of November 30, 1931, compares as follows:

ASSETS		1931	1930
†Fixed assets.		\$37,049,924	\$37,515,795
Patents		73,128	389,921
Cash		52,845	
Cash on dep. with trustee		730,453	1,895,057
Notes and accts. rec., etc.		2,385,804	3,214,283
Inventories		1,175,900	804,580
Stripping		191,858	270,143
Prepayments			377,703
Adv. emp. stk. plan		33,712	301,876
Def. chgs.		810	96
Sinking fund, cash			
Total		\$41,693,934	\$44,769,454
LIABILITIES		1931	1930
Pfd. stock.		\$4,715,700	\$5,000,000
Com. stock.		*19,555,841	19,655,556
Funded debt.		17,921,000	18,138,500
Bank loans.		579,382	750,000
Accts. pay.		156,208	276,195
Accruals		250,958	378,448
Interest due.		†642,493	
Fed. tax res.		52,395	54,949
Notes pay. (not curr.)		25,969	
Earn. def.		2,206,012	†515,806
Total		\$41,693,934	\$44,769,454

*Represented by 1,455,138 no-par shares. †After depreciation and depletion. ‡Surplus. ¶Includes \$559,097 interest due on November 1, 1931, and \$83,396 interest after November 1, 1931.

CURRENT DIVIDENDS

COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE	COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE
Alpha Portland Cement.	Common	\$0.25 qr.	Jan. 2	Jan. 25	Missouri Portland Cement.	Common	\$0.25 qr.	Jan. 21	Jan. 30
American Aggregates.	Preferred	\$1.75 qr.	Dec. 21	Jan. 1	Monolith Portland Cement.	Preferred	\$0.40 S.A.		Jan. 2
Arundel Corp.	Common	\$0.75 qr.	Dec. 21	Jan. 2	Monolith Portland Cement.	Common	\$0.40 S.A.		Jan. 2
Boston Sand & Gravel.	Preferred	\$0.87 ½ qr.	Dec. 22	Jan. 2	National Gypsum Co.	Preferred	\$1.75 qr.	Dec. 15	Jan. 2
Boston Sand & Gravel.	Common	\$0.15 qr.	Dec. 22	Jan. 2	New York Trap Rock.	Preferred	\$1.75 qr.	Dec. 21	Jan. 2
Calaveras Cement.	Preferred	\$1.75 qr.	Dec. 31	Jan. 15	Owens-Illinois Glass.	Common	\$1.50 qr.	Jan. 30	Feb. 15
Dolese & Shepard.	Common	\$1.00 qr.	Dec. 21	Jan. 2	Owens-Illinois Glass.	Preferred	\$1.75 qr.	Mar. 16	Apr. 1
Great Lakes Dredge & Dock	Common	\$0.25 qr.	Feb. 5	Feb. 15	Pacific Portland Cement.	Preferred	\$1.62 ½ qr.	Dec. 31	Jan. 5
Ideal Cement.	Common	\$0.50 qr.	Nov. 15	Jan. 2	Pennsylvania Glass Sand.	Preferred	\$1.75 qr.	Dec. 16	Jan. 1
International Amiesite.	Preferred	\$1.75 qr.	Nov. 20	Jan. 1	Riverside Portland Cement.	Preferred	\$1.50 qr.	Jan. 15	Feb. 1
International Salt.	Common	\$0.75 qr.	Dec. 15	Jan. 2	Smith Agricultural Chemical.	Preferred	\$1.50 qr.	Jan. 21	Feb. 1
Johns-Manville.	Common	\$0.25 qr.	Dec. 26	Jan. 16	Southwestern Portland Cement.	Preferred	\$2.50 qr.		Jan. 1
Kelley Island Lime & Trans-	Common	\$0.25 qr.	Dec. 24	Jan. 1	Southwestern Portland Cement.	Common	\$1.50 qr.		Jan. 1
port.	Common	\$1.75 qr.	Dec. 10	Jan. 2	Superior Portland Cement.	Class A	\$0.27 ½ M	Jan. 23	Feb. 1
Kentucky Rock Asphalt.	Common	\$1.75 qr.	Dec. 14	Jan. 2	Warner Co.	1st Pfd.	\$1.75qr.	Dec. 15	Jan. 1
Lehigh Portland Cement.	Preferred	\$1.75 qr.	Dec. 14	Jan. 2	Warner Co.	2nd Pfd.	\$1.75 qr.	Dec. 15	Jan. 1
Medusa Portland Cement.	Common	\$1.50 qr.	Dec. 25	Jan. 1	Worcester Salt.	Common	\$1.25 qr.	Dec. 24	Jan. 2

Review of Foreign Practice

Air-Swept Grinding Mill Widely Used in Germany

The air-swept, ring-roller grinding unit known as the Loesche mill combines some of the principles and advantages of the earliest ring-roller mills of the Maxecon type, which have been well liked in Germany since their introduction about twenty years ago, and of the well known edge runner ("dry-pan" or "wet-pan"), with those of large-capacity operation, positive sizing, and ability to dry damp materials in the same operation by using warm air in the mill circuit. These mills like the Maxecon mills take a wet feed without inconvenience and their action is one of mixing as well as grinding, as in the edge runner.

The first high-capacity Loesche mill was installed in a Westphalian cement plant three years ago. This mill grinds 18 metric tons of limestone and marl hourly, with 6 per cent. average moisture, to 20- to 25-per cent. residue on the 4900-mesh per sq.cm. (approximately 175 mesh per lineal inch) screen with, it is claimed, an investment in machinery including motors of only half that of compound mills, driers and accessories for the same capacity. Power consumption, on the basis of the three-year observations, is 12.1 kw.h. per metric ton.

Other important uses for these mills in the cement industry are the firing of rotary driers and rotary kilns with pulverized coal, which is dried and ground in a single operation and blown into the drier or kiln immediately or after a brief storage period.

The accompanying illustration shows one layout for feeding a rotary kiln, in which 1 is the raw coal bin, 2 the mill, 3 the feed bin, 4 a connecting air duct, 5 the fan, 6 the pulverized-coal-feeder screw, 7 the kiln-feed duct, 8 the rotary kiln, 9 a rotary cooler, 10

the hot-air conduit from the kiln-cooler unit to the mill, 11 the air-return duct, and 12 the fresh-air entrance.—Dipl.-Ing. H. Laeger in *Zement* 20: 918-921, Oct. 15, 1931.

Temperature Influence on Setting of Cements

In a series of tests to study the influence of temperature on the setting and hardening of fused-alumina cement and high-test Portland, specimens were prepared from ten of the former, five German and five foreign from six plants, and from ten high-test Portlands from three plants. The two varieties of cement were not essentially different in fineness and in specific gravity. The average values for the compressive strength of the high-test Portlands lay only a little above the lower limits of the alumina cement; on the other hand, the alumina cements did not always reach the average value of the tensile strength of the high-test Portlands. These results, however, refer only to the temperature range of approximately 15 to 20 deg. C.; higher and lower temperatures affect the two cements in varying fashion; curves of the 24-hr. strengths of the two varieties of cement in temperatures varying from 6 to 45 deg. C. show a steadily increasing compressive strength, while alumina cement drops rapidly after its maximum (15 to 20 deg.) and, though it rises again, does not equal Portland. These results add to and confirm previous investigations; those of Roscher Lund, for instance, fixed the most favorable hardening temperature for alumina cement at 16 deg. C. and the "critical" temperature, beyond which the ultimate strength of the cement is lowered, at 39 deg.

Curves of the beginning of hardening and of the setting time of alumina

cements at temperatures within the same range show gradual decreases in time from 6 to about 18 deg., then an abrupt retarding of the initial hardening and time of set; the greatest retarding of the three cements tested in this investigation occurred at 25 to 28 deg.; then the time again diminished, returning to about the same figures as 33 to 35 deg. as at 18 deg., then going below them. Tests were also made on steam treatment of the mortars; this lowered the strengths of the alumina cements, but raised those of Portland—Dr. Haegemann in *Tonindustrie-Zeitung* 55: 1430-1431, Dec. 24, 1931.

Advantages of Gas for Firing of Rotary Kilns

Firing rotary kilns with gas, which has made better headway in America and Germany than in France, has a number of important advantages over coal firing, particularly if gas is easily available or a generator installation is properly designed. Important among these advantages are: (1) utilization of residuary gases from other industries, or of fuel of low grade which could not be used without gasification; (2) minimum costs of maintenance and power, the latter being scarcely comparable to the costs of grinding fuel; (3) production of highly pure materials as required in many industries where rotary kilns are used.—E. de la Folle de Joux in *Revue des Matériaux de Construction* No. 265, pp. 401-402, Oct., 1931.

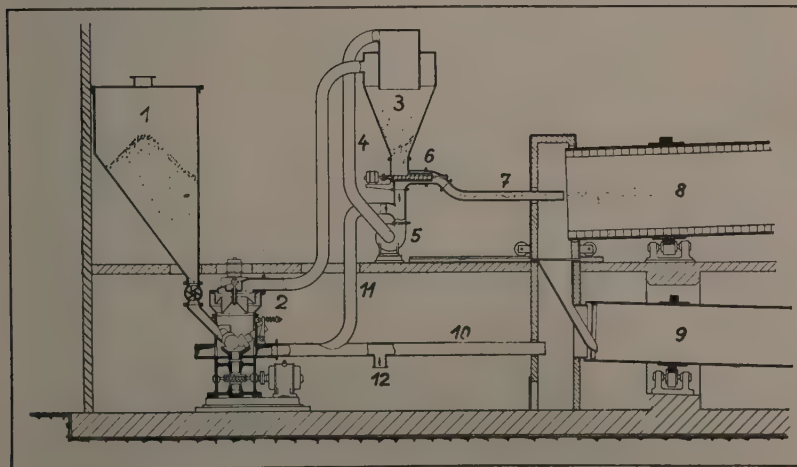
Organize New Interports Transportation Company

Announcement was made of the formation of the Interports Transportation Corp., of New York, an organization designed to handle the transportation of coal, granite, fertilizer, stone products and other bulk material between New York harbor and New England ports.

The new company, formed to take over the business of Bee Line Transportation Co., will be closely affiliated with Moran Towing & Transportation Co., Inc., New York.

By combining the facilities of the Bee Line organization with certain of the equipment of the Moran group, the new company will place at the disposal of its clients a formidable service comprising 85 major units made up of 63 scows, barges and lighters and 22 harbor and coastwise tug boats.

With these augmented facilities the new company plans materially to increase the number of communities served both in New England territory and in New York and New Jersey communities bordering on New York harbor.



Air-swept ring-roller mill feeding powdered coal to rotary kiln.

Recent Patents

AMERICAN

Cement and Concrete

Process for the production of high-early-strength hydraulic cement. Joseph F. Goddard, London, England, assignor to Super Cement Co., Detroit, Mich. No. 1,840,710.

Charging device for concrete mixers. John P. Faber, Dunellen, N. J., assignor to Ransome Concrete Machinery Co., Plainfield, N. J. No. 1,841,100.

Crushing and Grinding

Crushing mill. Ernst C. Loesche, Berlin-Lankwitz, Germany, assignor to International Combustion Engineering Corp., New York, N. Y. No. 1,840,366.

Pulverizing apparatus. L. V. Andrews, Worcester, Mass., assignor to Riley Stoker Corp., same place. No. 1,840,380.

Excavating

Back digger (swinging-dipper type). Emery J. Wilson, Cleveland, O., assignor to The Shovel Co., Lorain, O. No. 1,840,550.

Washing

Gravel cleaner. Joseph C. Barr, Pittsburgh, Pa. No. 1,841,079.

FOREIGN

Cement and Concrete

Waterproofing hydraulic cement and composition. Frederick W. Huber, Riverside, Cal. Canadian 318,980.

Process for hydrating cement clinker. Klöckner-Werke Akt.-Ges. Abteilung Mannstaedterwerke, Troisdorf bei Köln. German 541,763.

Process for impregnating articles of concrete, cement or the like. Fritz Frenzel, Dessau. Germany 541,921.

Process for burning cement, using a plate shaft kiln and a following rotary kiln. G. Polysius Akt. Ges., Dessau. German 542,149.

Excavating

Rotary cutter for suction dredges. American Manganese Steel Co., assignee of Bradley S. Carr, Chicago, Ill. Canadian 319,035.

Dipper front. American Manganese Steel Co., Chicago, Ill., assignee of Alfred H. Exton, Marion, O. Canadian 319,036.

Intertooth scraper for excavating implements. American Manganese Steel Co., Chicago, Ill., assignee of John O'Fallon Clark, University City, Mo. Canadian 319,037.

Dipper tooth. Electric Steel Foundry Co., assignee of Lewis Edward Younie, Portland, Ore. Canadian 319,082.

Attachment of guide-block to post in scraper operation. Gesellschaft für Bergwerksunternehmungen m.b.H., Essen. German 542,137.

Material-Handling

Conveyor. United Conveyor Corp. of Canada, Ltd., Toronto, Ont., assignee of Edgar B. Toltman, Jr., Chicago, Ill. Canadian 318,904.

Grab bucket. Heinrich Reichmann, Duisburg-Ruhrort, Germany. Canadian 319,017.

Automatic distributor for granular materials. Dipl.-Ing. Rudolf Schäfer, Langenzell, Neckargemünd, Baden. German 541,894.

Supporting device for shaking-trough conveyors. Kosmos G. m. b. H. Rud. Pawlikowski Görlitzer Maschinenfabrik, Görlitz. German 541,817.

Shaking-trough union. Dipl.-Ing. Otto Vedder, Essen-Kupferdreh. German 541,898.

Apparatus for connecting trough sections with transverse bands. Dipl.-Ing. Otto Vedder, Essen-Kupferdreh. German 41,899.

Dumping device for pit cars. Carlshütte Akt.-Ges. für Eisengiesserei und Maschinenbau, Waldenburg-Altwasser. German 541,900.

Apparatus for lifting and tipping cars. Handelsgesellschaft Westfalen G. m.b.H., Essen. German 541,901.

Swinging elevator. Arthur Fontaine, Jean Geest, Belgium. German 542,325.

Device for lubricating moving axes of bucket elevators. Adolf Bleichert & Co. Akt.-Ges., Leipzig. German 542,135.

Automatic dumping apparatus. Ateliers de Construction de la Basse-Sambre Soc. Anon., Moustier sur Sambre, Belgium. German 542,326.

Mixing

Mixing apparatus. Transit Mixers Inc., assignee of Albert Knowles, San Francisco, Cal. Canadian 318,988.

Mixing apparatus. Canadian Gypsum Co., Ltd., Toronto, Ont., assignee of John J. Turner, Chicago, and Carol Absmeier, La Grange, Ill. Canadian 319,055.

Concrete mixer. Chain Belt Co., Milwaukee, Wis. German 541,762.

Screening and Separating

Mineral-recovery device. Gustaf Leonard Kvist and Francis Bernard McConville, Kamloops, B. C. Canadian 318,770.

Apparatus for separating intermixed divided materials. Peale-Davis Co., Wilmington, Del. Canadian 318,940.

Air Separator. Alpine Akt.-Ges. Eisengiesserei und Maschinenfabrik Augsburg, Augsburg, and Albert Kuhr, Göggingen bei Augsburg. German 542,144.

Unclassified

Adjustable steel pit-props and girder-arch legs, for the support of roofs in underground workings. F. Richards. British 363,498.

Production of alumina from alkaline earth aluminates. Lonza Elektrizitätswerke und Chemische Fabriken Akt.-Ges. British 363,612.

Production of uniformly-burned clay for making concrete aggregate. Hugo Schwartzkopf, Berlin-Steglitz. German 542,322.

Accept Tests Only from Inspected Laboratories

On and after April 1 the U. S. Bureau of Public Roads will accept reports of cement tests only from those laboratories that have been inspected by the Cement Reference Laboratory at the Bureau of Standards, which is maintained jointly by the American Society for Testing Materials, the Portland Cement Assn., and the government. It is expected that this ruling will add considerably to the work of the Cement Reference Laboratory, whose inspections of cement laboratories are made upon request and without charge.

The Cement Reference Laboratory is under the supervision of John R. Dwyer, and it has recently been announced that Mr. Dwyer has been appointed technical assistant to Committee C-1 of the A. S. T. M. Inasmuch as the Cement Reference Laboratory is sponsored by Committee C-1, Mr. Dwyer's new appointment will strengthen the connection between the committee and the laboratory.

Supt. Young of Lehigh Plant Talks to Foremen

Members of the Illinois Valley Foremen's Club at the January monthly meeting, held at LaSalle, Ill., heard an interesting address by John Young, superintendent of the Lehigh Portland Cement Co. plant at Oglesby, Ill., whose topic was "The Value of Associations."

"The foremen of today must be alive to outside conditions if they are to be of any value to industry," said Mr. Young. "They must be alive and constantly alert for new ideas and new methods of production."

"Much can be accomplished through an organization such as the foremen's club. You must maintain constant contact with other people and use every opportunity for an exchange of ideas on various industrial problems."

PIT AND QUARRY will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.

Manufacturers' Publications

Each publication listed below contains information of interest to non-metallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY when writing.

Bins

Butler Bins and Hoppers. 16 p. (Bull. No. 170A. Butler Bin Co., Waukesha, Wis.) Describes and illustrates a line of steel bins and hoppers and points out their applicability to modern concrete-products plants. Typical plant designs employing the bins and hoppers are given in several drawings.

Cement Unloaders

Portable Fuller-Kinyon Systems. 4 p. (Fuller Co., Catasauqua, Pa.) A folder printed especially for distribution at the recent Road Show at Detroit, pointing out the economical advantages of the Fuller-Kinyon portable cement pump for unloading bulk cement from box-cars and barges. A typical layout for a ready-mixed concrete plant is shown.

Concrete Carriers

Portland Truck-Mixers. 8 p. (Bull. No. 32. Portland Concrete Machines Co., Cleveland, O.) Describes and illustrates a line of concrete carriers in capacities ranging from 1 to 5 cu.yd. for mixing concrete enroute from the batching plant to the construction job. The booklet features particularly the 1-cu.yd. model mounted on a Chevrolet chassis.

Conveyors, Portable

Burch Portable Conveyor. 4 p. (The Burch Corp., Crestline, O.) Describes and illustrates a portable conveyor operated by a built-in gasoline engine for the handling of sand, gravel and other materials. The conveyor may also be had with an electric-motor drive.

Cranes

Nelson Tractor Crane. 4 p. (The N. P. Nelson Iron Works, Inc., Pasaic, N. J.) Describes and illustrates a small portable crane used for rapid and economical handling of packages and machinery up to 2,000 lb. in weight.

Culverts

Armco Culverts and Drainage Products. 78 p. (Armco Culvert Manufacturers Assn., Middletown, O.) Describes and illustrates a line of corrugated-iron culverts and drainage products including notes on field problems and other useful information.

Dump Bodies

Fast and Safe with the Cushion-Drop Mechanism. 4 p. (Perfection Steel Body Co., Galion, O.) Describes and illustrates the new Perfection hydraulic-dumping unit for use with short-wheelbase trucks. The units are of all-steel construction and feature a heavy-duty hydraulic hoist which is said to be fully automatic.

Engines, Gasoline

Buda M. A. N. Diesel. 4 p. (Bull. No. 633A. Buda Co., Harvey, Ill.) Describes and illustrates a high-speed, light-weight, full-Diesel engine available in three models, two of 4 cylinders and one of 6 cylinders, developing from 92 to 180 hp. at 1,000 r.p.m.

Excavators

Bay City Tractor Shovel and Crane-mobile. 24 p. (Cat. No. T7, Bay City Shovels, Inc., Bay City, Mich.) Describes and illustrates the tractor shovel mounted on crawlers and a crane mounted on pneumatic tires for handling materials in the pit, quarry or from stock-piles.

Motor Trucks

Reo Big 4-Tonner. (Reo Motor Co., Lansing, Mich.) A folder in colors describing and illustrating the Reo 4-ton truck. Features include a 6-cylinder engine with a 7-bearing crankshaft, hydraulic 4-wheel brakes and a 4-speed transmission. The standard model was built on a 150-in. wheelbase. The truck is also available in 170-in. and 190-in. wheel bases. Another folder of the company describes its 1½-ton Speed Wagnons.

Dodge Bros. Trucks. 4 p. (Bull. CF1. Chrysler Motors Corp., Detroit, Mich.) Describes and illustrates the Model UF10 Dodge truck made by this concern. Although of relatively small capacity—handling a maximum of 1,200 lb.—the feature of the truck is its high allowable speed of 40 mi. per hr., making it of particular service for quick deliveries of small quantities of materials.

Scales, Automatic

The Richardson Convey-O-Weigh. 8 p. (Richardson Scale Co., Clifton, N. J.) Describes and illustrates an automatic scale for the accurate weighing and proportioning, as well as intimate mixing of loose raw materials.

Screens

Specifications of the New Barber-Greene Vibrating Screen. 4 p. (Bull. V62. Barber-Greene Co., Aurora, Ill.) Explains through condensed specifications, drawings and photographs the outstanding features of the new Barber-Greene vibrating screen, designed for use with portable bucket loaders.

Wire Rope

Why Preformed Rope? (American Cable Co., New York, N. Y.) Describes and illustrates the construction of Tru-Lay preformed wire rope and points out its advantages through a series of exceptionally graphic drawings.

Bowlers Establish High Score in Illinois Match

The Moulding-Brownell Corp. bowling team of Chicago established a new world's record for tournament bowling by toppling 3,450 pins in the interstate tourney held at Aurora, Ill., in January. It is the highest score ever recorded in a tournament sanctioned by the American Bowling congress. The Moulding-Brownell Corp. is one of the largest producers of aggregate in the Chicago area. The score of the event was as follows:

Herb Freitag.....	211	237	268—	716
Joe Brichetto.....	225	205	210—	640
Bill Heerman.....	210	258	234—	702
Pete Petersen.....	188	268	265—	721
Jim Brown.....	191	255	225—	671
Totals	1,025	1,223	1,202—	3,450

Electrical Firm Makes Ohio-District Changes

The Reliance Electric & Engineering Co., Cleveland, manufacturers of alternating and direct-current motors, announce the following branch office changes:

The Cincinnati office has been moved to 2905 Carew Tower, with J. L. Van Nort in charge. H. A. Holmes has been made salesman in charge of the Toledo office. L. M. Dunning has been transferred to the Cleveland district office.

Selects Distributors in Cleveland and Milwaukee

The Byers Machine Co. announces that the W. T. Walsh Equipment Co., Cleveland, and the Boeck Equipment Co., Milwaukee have been added to their distributor organization. These distributors will handle the complete Byers line of 26 different machines including the new ¾-cu.yd. Golden Anniversary shovel.

Book Review

STATISTICAL ABSTRACT OF THE UNITED STATES FOR 1931. 880 pp. Published by the U. S. Dept. of Commerce, Washington, D. C. Price \$1.25. The fifty-third annual edition of this valuable reference work. Contains statistics on the various mining and manufacturing industries under such headings as capital employed, wages paid, wage earners, cost of materials, power consumed, value of products, prices, exports and imports, etc. Comparative figures for a number of years are presented so the volume affords a handy sourcebook of authentic data on every conceivable branch of business, industry and commerce. Bound in buckram, copies may be obtained from the Superintendent of Documents, Washington, D. C., or from any of the 40 branch offices of the Bureau of Foreign and Domestic Commerce.

New Machinery and Supplies

Concrete Carrier Uses Spring-Blade Agitators

Engineers, contractors and architects are more and more favoring and recommending the use of ready-mixed concrete, consequently a new problem or condition has developed—that of transporting the ready-mixed concrete from a central plant, where the concrete is scientifically and uniformly mixed, to the job. Unless the wet concrete is kept in proper agitation during the trip, it is impossible to deliver uniform full strength concrete.

The solution to this problem is the Hug spring-blade agitator, manufactured by the Hug Co. of Highland, Ill., which makes possible a haul of 50 miles or more from a central-mixing plant to a point of delivery at the job, of a uniform, full-strength concrete, without segregation of the component parts and without loss of water content by aeration.

The principle of the Hug spring-blade agitator is to keep the mass of wet concrete in steady, constant agitation during the entire trip and during the unloading without any throwing, dropping, lifting or tumbling action. This procedure is accomplished by forcing the spring blades down through the mass of wet concrete, displacing the concrete from the bottom and side walls, causing a kneading action, the blades constantly rotating through the mass while in transit and while unloading, thus improving the quality of the ready mixed concrete received at the central mixing plant.

Simplicity is an outstanding feature of the agitator. The inside walls are perfectly smooth. The agitation of the concrete is effected by four blades attached to spring arms and a shaft

which rotates the blades through the concrete. The shaft is supported on each end of the body by leak-proof bearings. The power to rotate the spring-blades is furnished by an independent 3-hp. air-cooled gasoline engine, power being transmitted direct from the engine through a worm and drive gear, the drive gear being attached to the shaft on front end of the agitator body.

The ready-mixed concrete is loaded direct from the mixer chute into the spring-blade agitator body and with the independent engine driving the agitator, the wet concrete is in constant agitation until discharged from the body. The rotary movement of the spring-blade thoroughly agitates and remixes the concrete and, as the wet concrete leaves the body and relieves the pressure from the spring blades, the action of the springs then causes the blades to engage with the side wall and a scraping action takes place which thoroughly cleans the sides of the body. There is no accumulation of material to harden on the sides of the body. The spring-blades remain in motion until the complete load is discharged.

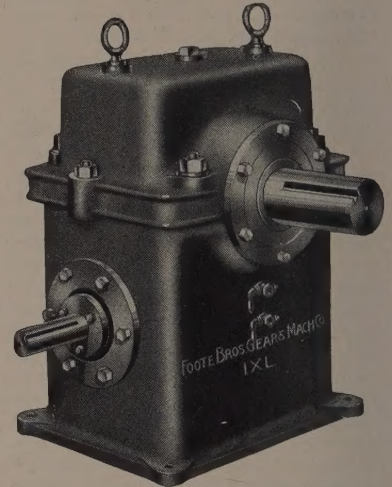
New Speed-Reducer Unit for Medium-Duty Service

Foote Bros. Gear & Machine Co. of Chicago has announced an addition to its series of Hygrade worm-gear speed-reducers, designed to transmit up to 14 hp. continuous duty, this capacity depending on driving shaft speed and the reduction ratio.

The new unit is designated Size 5-HG and fills a gap between sizes 4-HG and 6-HG, which in special cases could not be met economically by use of either of these last mentioned units.

Like the other sizes in this line, the new reducer will be built in five types, with worm at bottom, with worm on top, with worm-gear shaft vertical, worm reducer with helical attachment, and one model with double worm and worm gear reduction. A wide range of ratios is available, varying from 3.5 to 1 to 3,000 to 1.

All shafts are heat-treated alloy steel mounted on oversize anti-friction bearings, usually SKF thrust and radial ball bearings on the worm shaft



New worm-gear speed-reducer.

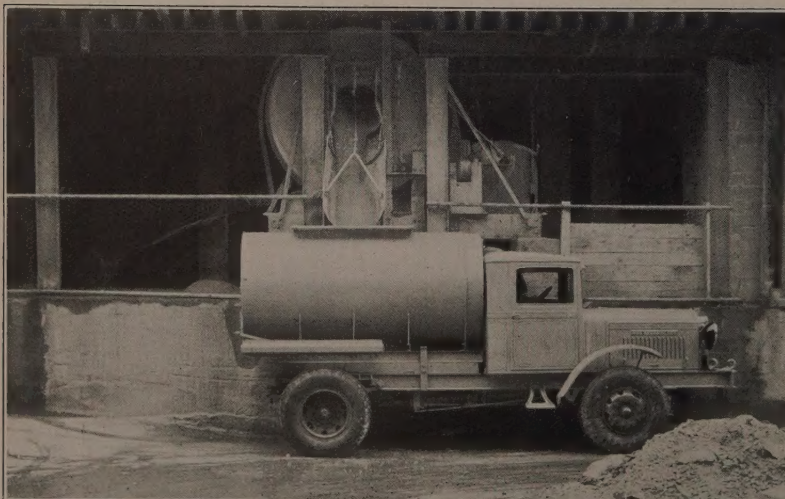
and Timken tapered roller bearings on the worm gear shaft. Bearings permit a hung load of 1,750 lb. on the slow speed shaft of the vertical type. Maximum chain pull of the slow-speed shaft is 1,375 lb. in this size.

The worm and worm gear are mounted in a substantial, oil-tight, dust-proof, cast-iron housing which provides a rigid support for bearings. Walls and flanges are of heavy section in accordance with accepted design standards. The base of the reducer is cast integral with the housing and has drilled bolt holes for mounting on a concrete foundation or other support.

Lubrication is accomplished effectively by the splash system. Oil circulation is obtained through the action of worm and gear with the case so designed that oil is automatically supplied in ample quantities to all bearings.

Introduces a $\frac{3}{8}$ -Cu. Yd. Convertible Excavator

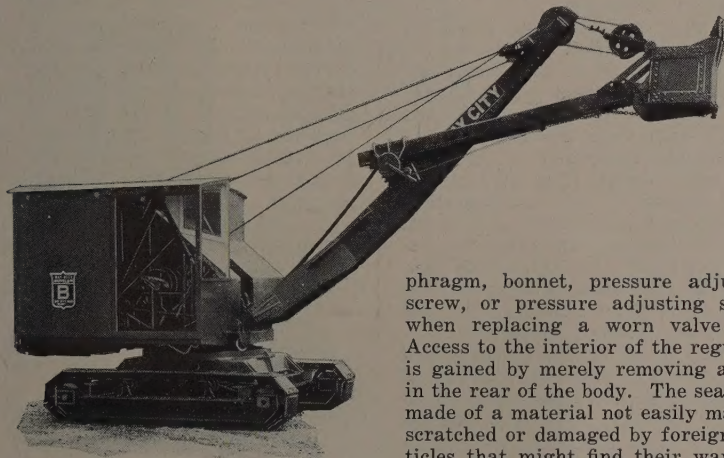
The Model B Bay City full-revolving convertible shovel, crane and excavator with $\frac{3}{8}$ -cu.yd. bucket capacity, full measure rating on line of plate basis with crane capacity of five tons and convertibility including clam-shell, drag-line, skimmer, trench hoe and



Mixer charging the spring-blade-agitator carrier.

other attachments was first displayed to the general public at the Detroit Road Show. This machine weighs 27,000 lb., equipped as a shovel. The standard shovel boom length is 15 ft., with optional 17 ft. boom if desired. The crane-boom length is 30 to 35 ft.

The Model B, in pattern and design, is identical with the heavy-duty Bay City $\frac{3}{4}$ - and 1-cu.yd. models. It is



The full-revolving convertible shovel.

offered with either a McCormick-Deering 40 hp. power unit, or the Hercules $4\frac{1}{2}$ -in. bore, $5\frac{3}{4}$ -in. stroke engine. All Bay City features are built into this machine, including powerful chain crowd, heavy unit-cast car body, unit-cast revolving machinery table, heavy-duty patented swing lock, frictionless New Departure and Timken bearings on all machinery, shafts, large 7-in. center post and wide diameter swing circle, double lubrication, electric welded shovel boom of heavy plate construction with divided sticks with gear and rack crowd.

The machine features compact arrangement with drums in tandem on separate shafts, E-Z finger clutch control, machine-cut gears over table rollers on the cast machinery table less than 30 in. from the center post.

New Line of Acetylene and Oxygen Regulators

The Linde Air Products Co., New York, N. Y., has introduced an entire series of new and improved Purox oxygen and acetylene regulators superseding its former line of Purox Metal Master type of regulators. All Purox welding or cutting outfits now include these new regulators.

The new series comprises six regulators, designated as Nos. 33 and 34 for acetylene; Nos. 13, 14, 23 and 24 for oxygen. All regulators in this series have the same general external appearance. They are of all-metal construction, simple, compact, rugged and workmanlike in appearance and thoroughly reliable in performance. The required volumes of oxygen and acetylene essential for maintaining a

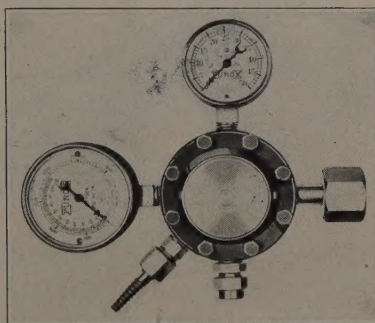
neutral flame at the blowpipe tip are delivered to the welding or cutting blowpipe at uniform pressure.

One of the outstanding design features of the new Purox regulators is an accurate self-aligning valve of the nozzle-and-yoke type, insuring sensitive action and freedom from leakage. Simplicity of construction also eliminates any need of disturbing the dia-

phragm, bonnet, pressure adjusting screw, or pressure adjusting spring when replacing a worn valve seat. Access to the interior of the regulator is gained by merely removing a plug in the rear of the body. The seats are made of a material not easily marred, scratched or damaged by foreign particles that might find their way into the inside of the regulator.

The diaphragms are made of a special corrosion-resisting alloy assuring long life. A rupturing disk safety release on the oxygen regulator provides protection to the diaphragm should an abnormal pressure occur. Although seldom, if ever necessary, the operation of replacing the diaphragm is quite simple. The cap bolts are merely removed and the diaphragm and yoke lifted out, no special tools being required.

Gauges for the new Purox regulators are heavy and well made in order to withstand the incidental rough usage of field work. The cases are polished brass with beveled plate



No. 14 oxygen-welding regulator.

glass crystals. The working-pressure gauges are 2 in. and the cylinder pressure gauges $2\frac{1}{2}$ in. in diameter.

In accordance with the standard color specification for oxy-acetylene equipment, oxygen regulators are painted green, and acetylene regulators red.

Purox regulators are listed as standard by the Underwriters' Laboratories and the Factory Mutuals Laboratories.

Fingertip Control Made Feature on New Shovel

The American Hoist & Derrick Co. of St. Paul, Minn., is offering a new model American Gopher shovel-crane-dragline, gasoline- or Diesel-engine-operated, in five sizes, namely, Model 375— $\frac{3}{4}$ -cu.yd.; Model 400—1-cu.yd.; Model 425— $1\frac{1}{4}$ -cu.yd.; Model 450— $1\frac{1}{2}$ -cu.yd.; and Model 475— $1\frac{3}{4}$ -cu.yd., all mounted on continuous chain crawler treads with two speeds.

All sizes are newly-designed, combining all of the latest features known in shovel manufacture. Compactness, simplicity of design, increased strength in all wearing parts, ease and convenience of operator, and levers



The new shovel-crane-dragline.

having finger-tip control, are some of the combined features of the new American Gopher in each of the new models.

To Handle Equipment for Cement-Products Plants

The Kent Concrete Machinery Co. has been recently organized by F. R. Brautigam and H. F. Holtje, well-known concrete-products engineers of New York. The offices of the new company are located at 9130 West 42nd St., New York, and the firm represents in the eastern district The Kent Machine Co. of Cuyahoga Falls, O., and the Blystone Manufacturing Co. of Cambridge Springs, Pa.

Not only will the new company specialize in supplying all equipment required for use in the concrete-products industry but each member of the company will give, out of his broad experience engineering service and advice relative to products-plant layout, based upon the most up-to-date methods for handling materials and manufacturing concrete units.

A. C. I. to Gather in Washington Mar. 1-4

OUTLINE TENTATIVE PROGRAM

A tentative outline of some of the events on the program for the 28th Annual Convention of the American Concrete Institute, to be held March 1-4 at the Wardman Park Hotel, Washington, D. C., has been announced as follows:

Tuesday, March 1

Report of Committee 502, Arthur R. Lord, Chairman.
Report of Committee 503, William F. Zabriskie, Chairman. Steel to letter ballot for adoption as a standard.
Report of Committee 506, Arthur R. Lord, Chairman.
"Problems in the Design and Construction of Concrete in Major Irrigation Structures" by Byram W. Steele, Civil Engineer, U. S. Bureau of Reclamation, Denver.
"Concreting Problems in the Chats Falls Power Development" by Col. H. L. Trotter, Fitzroy Harbor, and Wilfred Schnaar, Hydro-Electric Power Commission of Ontario, Toronto.
"Cast Stone as a Means to Color in Architecture" by Fred R. Lear, Department of Architecture, Syracuse University.
"The Design of Concrete Arches in Allegheny County" by G. S. Richardson, Assistant Engineer of Bridge Design, Department of Public Works, Allegheny County, Pa.
"The Construction of Concrete Arches in Allegheny County" by V. R. Covell, Chief Engineer, Department of Public Works, Allegheny County, Pa.

Wednesday, March 2

"The Structural Performance of Concrete Masonry Walls" by F. E. Richart, Research Professor of Engineering Materials, University of Illinois.
"The Effect of Mortar Strength on the Strength of Concrete Masonry Walls" by R. E. Copeland, Engineer Cement Products Bureau, and A. G. Timms, Associate Engineer, Research Laboratory, Portland Cement Association.
"The Strength of Concrete Masonry Walls After Standard Fire Exposure" by C. A. Menzel, Portland Cement Association.
"Properties and Problems of Masonry Cements" by J. C. Pearson, Director of Research, Lehigh Portland Cement Co.
"The Design, Construction and Test of the Rogue River Bridge" by Albin L. Gemeny, Senior Structural Engineer, Bureau of Public Roads, and C. B. McCullough, Bridge Engineer, Oregon State Highway Department.
"Deflections and Vibrations in High Structures" by L. J. Mensch, Engineer and Contractor, Chicago.

Thursday, March 3

"Studies of the Workability of Concrete" by T. C. Powers, Portland Cement Association.
"New Studies of Light Weight Building Materials" by H. Herbert Hughes, Building Materials Section, Bureau of Mines.
"The Effect of Vibration on Concrete"—a progress report from Committee 106, R. F. Leftwich, Author-Chairman.
"Tests of Transit Mixing" by S. C. Hollister, Professor of Structural Engineering, Purdue University.

Friday, March 4

"The Mt. Vernon Memorial Highway" Design—by R. E. Toms, Principal Highway Engineer, Bureau of Public Roads.
Construction—by J. W. Johnston, District Engineer, Bureau of Public Roads.
Proposed Specifications for Concrete Pavements for Municipalities—Report of Committee 902, Concrete Pavement Standards, F. C. Lang, Chairman.
"The Mortar Voids Method of Designing Concrete Mixtures" by Mark Morris, Iowa State Highway Department.

Damage estimated at several thousand dollars was caused recently by fire which almost completely destroyed the plant of the Lancaster Sand Co., located near Gosline, O.

Fire Destroys \$250,000 Plaster Plant in Utah

The Jumbo Plaster & Cement Co. plant at Sigurd, Utah, was destroyed January 27 by fire, thought to be of incendiary origin. The plant was worth about \$250,000, all but approximately \$25,000 of it—the building—being in machinery. It was partially covered by insurance.

The plant had been shut down for some months until a day before the blaze occurred, when the sacking department had operated, but no fire had been used in the building, it was stated. The mill foreman always made nightly inspections of the plant, and went through it at 10 p.m. the night preceding the conflagration, when he reported everything in order.

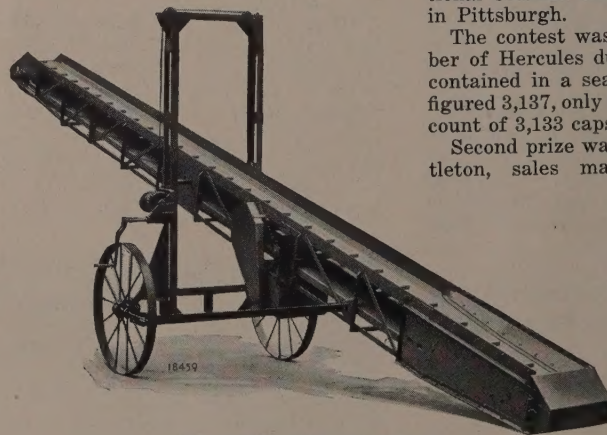
In less than an hour after the discovery of the fire the entire plant was in ashes. The office building and the water-power plant, however, some distance away, escaped damage.

It was stated that no decision will be reached regarding the rebuilding of the plant until after the annual stockholders' meeting to be held shortly.

Light Weight Feature of Portable Belt Conveyor

A new light-weight, all-purpose 14-in. portable belt conveyor which can be handled easily by one man, is announced by The Jeffery Manufacturing Co., Columbus, O.

Anti-friction bearings are used throughout. The boom is of standard trussed construction, deep enough to give maximum strength with minimum



The portable 14-in. belt conveyor.

weight. The upper chords of the truss also serve as skirt-boards. A sheet-metal cover over the return belt adds to the rigidity of the boom.

The boom is properly balanced on 42-in. by 3-in. roller-bearing swivel wheels. The discharge height is quickly and easily regulated by a self-locking winch.

This machine was originally designed for the handling of anthracite coal, but it has been found extremely practical for unloading or reloading

sand, gravel, cinders, crushed stone, bituminous coal and coke.

It is powered by either electric motor or gasoline engine and its rated capacity is 50 tons per hour.

Oyster-Shell Shipment Inspires English Poet

A recent shipment to England of 15,000 bags of ground oyster shells from one of the American producers of this material along the Gulf of Mexico, intended for use as poultry grits to produce harder shells on the eggs laid by British hens, inspired the *Manchester Guardian* to lament the English hen's weakness in the following verse:

Oh, bitter news for patriot hearts,
black days for England's lover.

The British egg, though good in parts,
will wear a foreign cover;

And when the dawn is cold and blue,
the British cock, poor noodle,

Forgetting "Cock-a-Doodle-Do,"
will strike up "Yankee Doodle."

Awards Prizes for Best Guesses on Caps in Jar

With an estimate that was 99.9987 per cent. correct, Frank S. Jones, general superintendent of the General Crushed Stone Co., of Easton, Pa., won the first prize in the Hercules Powder Co. blasting-cap guessing contest for quarry operators at the recent National Crushed Stone Assn. convention in Pittsburgh.

The contest was to guess the number of Hercules dummy blasting caps contained in a sealed jar. Mr. Jones figured 3,137, only four from the actual count of 3,133 caps.

Second prize was won by E. T. Nettleton, sales manager, Connecticut Quarries Co., Inc., New Haven, Conn., with an estimate of 3,123; and third prize went to L. F. Miller, New York Trap Rock Corp., Haverstraw, N. Y., with a figure of 3,187.

In a separate contest for exhibitors at the convention, George S. Earnshaw, of the Illinois Powder Mfg. Co., Pittsburgh, Pa., won first prize; Roy Willis, advertising manager, Ohio Power Shovel Co., Lima, O., took second prize; and Delbert Kay, advertising manager, Nordberg Mfg. Co., Milwaukee, Wis., won third prize.

Practically everyone registered at the convention participated in the contest.